COAL AGE

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High Costs Get a Trimming!

SUN MINE LUBRICANTS

Take Over Complete Job . . . End Trouble . . . Cut Costs 30%

In analyzing lubrication costs, a large coal mine discovered that their practice of dividing purchases of oil and grease among several producers had resulted in excessive costs and a high rate of equipment failure. The results of a series of competitive tests, conducted over a period of several months, led this company to standardize on the complete line of SUN MINE LUBRICANTS.

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The success of this standardization was prompt and conclusive. Lubrication costs dropped an average of 30% and stayed there . . . and during the many years since, not a single piece of equipment has given trouble due to faulty lubrication.

A SUN "Doctor of Industry" will be glad to demonstrate how SUN LUBRICANTS can take over the entire lubrication job in *your* mine . . . at a saving in money, time and trouble. . . . Write

SUN OIL COMPANY, *Philadelphia*

Sun Oil Company, Limited, Toronto, Canada

SUNOCO

SUN PETROLEUM PRODUCTS

HELPING INDUSTRY HELP AMERICA

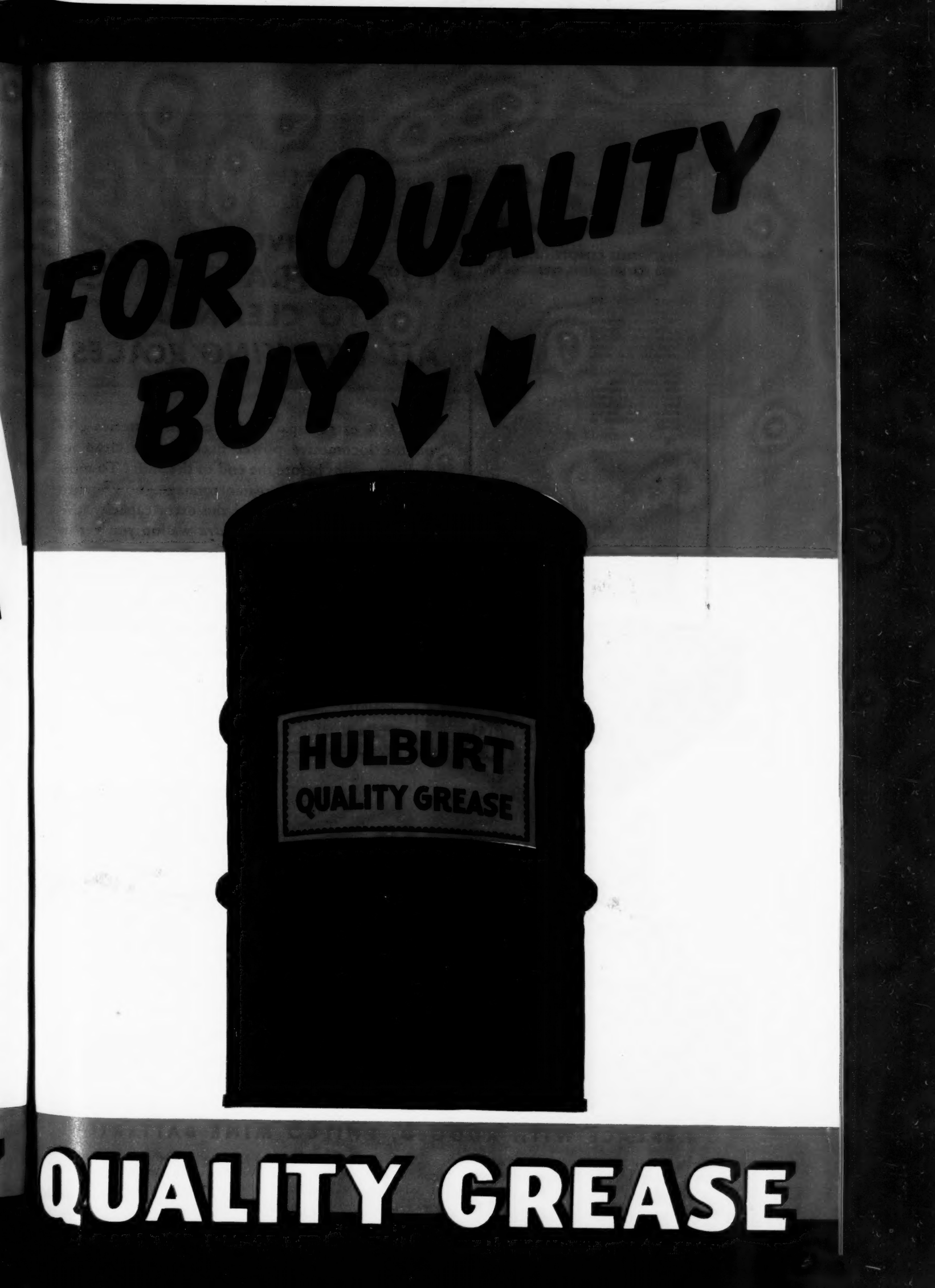
Victory depends, too, on coal production. And all-out coal production depends largely on present coal mine equipment. Coal mine equipment depends on the correct lubricant to keep it running smoothly—to avoid breakdowns. That's where QUALITY counts . . . the QUALITY you get in Hulburt Quality Grease, the only grease made exclusively for coal mine equipment . . . A down-in-the mine survey by Hulburt Lubrication Specialists involves no obligation—produces *results* . . . Write us today.

HULBURT OIL & GREASE COMPANY

Specialists in Coal Mine Lubrication

PHILADELPHIA . . . PENNSYLVANIA

HULBURT


FOR QUALITY
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HULBURT
QUALITY GREASE
QUALITY GREASE

PHILCO "XL" BATTERIES

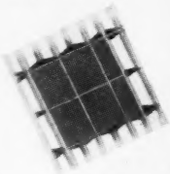
GIVE YOU 10% EXTRA CAPACITY TO CLEAN UP ALL WORKING PLACES!

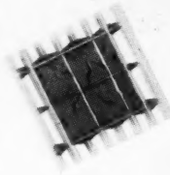
10% GREATER CAPACITY...SUSTAINED HIGH VOLTAGE...LONG PRODUCTIVE LIFE

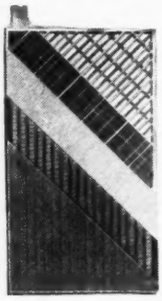
PHILCO "K" PROCESS

(*Upper right*) Philco "K" Process produces a flint-hard, porous plate with superior bond between active material and grid.

(*Lower right*) Ordinary plate drying. Active material contracts unevenly and away from grid, cracking on surface, and leaving center impervious to liquid.







PHILCO TRIPLE INSULATION

(*Left*) Philco Triple Insulation adds months of service by sealing active material into grid with Glass Fibre Mats, Slotted Rubber Retainers, rugged Philco Separators.

With 10% extra capacity, Philco XL Batteries give you the locomotive power necessary to clean up working rooms before the end of the shift! To meet today's demand for greater tonnage, now—more than ever before—you need the extra capacity, the sustained high voltage, the *extra* wallop you get in heavy duty Philco Batteries! Use the coupon.

PHILCO CORPORATION, STORAGE BATTERY DIVISION, TRENTON, N. J.

PHILCO CORPORATION, Storage Battery Division, Trenton, N. J.

Send me new, free Philco Mine Battery Catalog.

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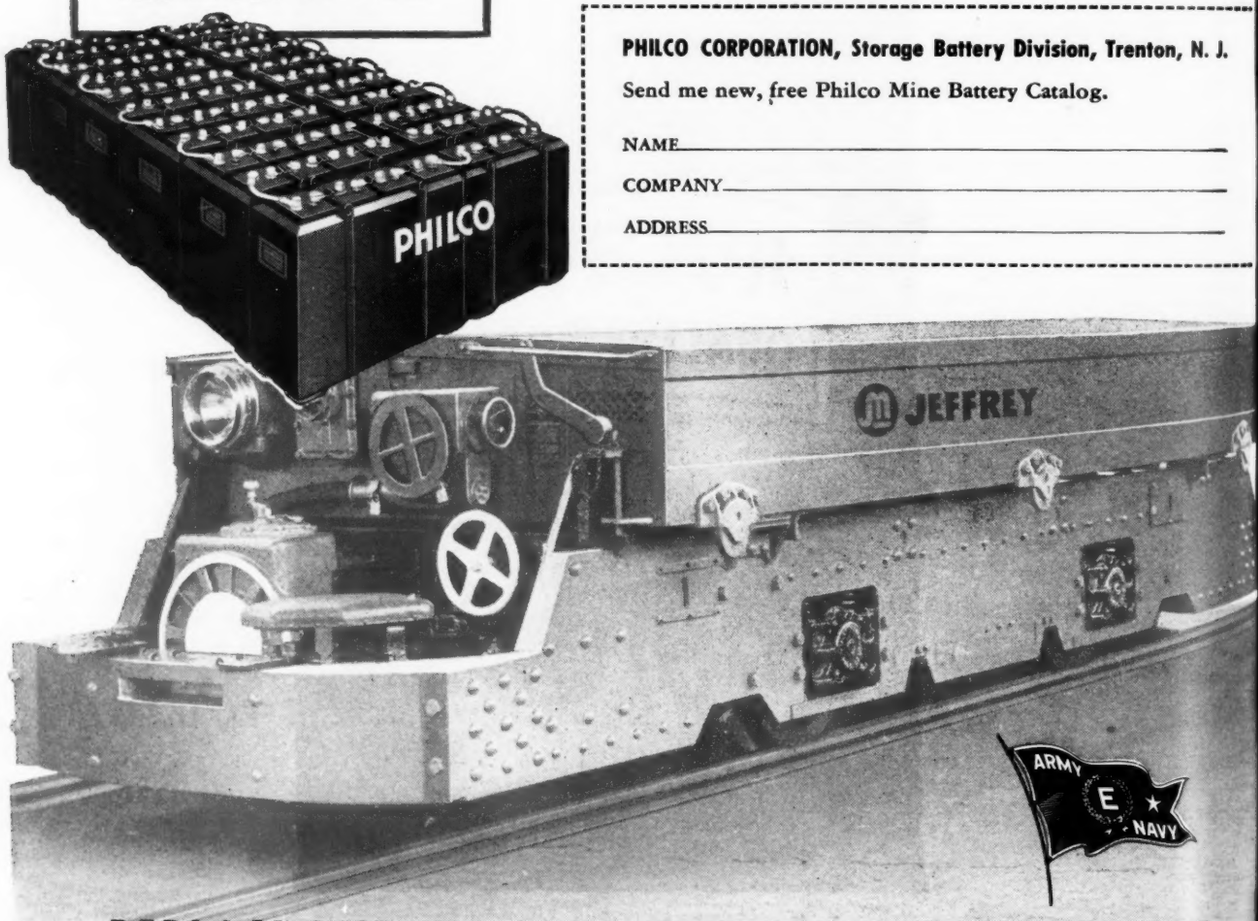
COMPANY_____

ADDRESS_____



REPLACE WITH RUGGED, PHILCO MINE BATTERIES!

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COAL AGE

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COMING COAL AGE ATTRACTIONS

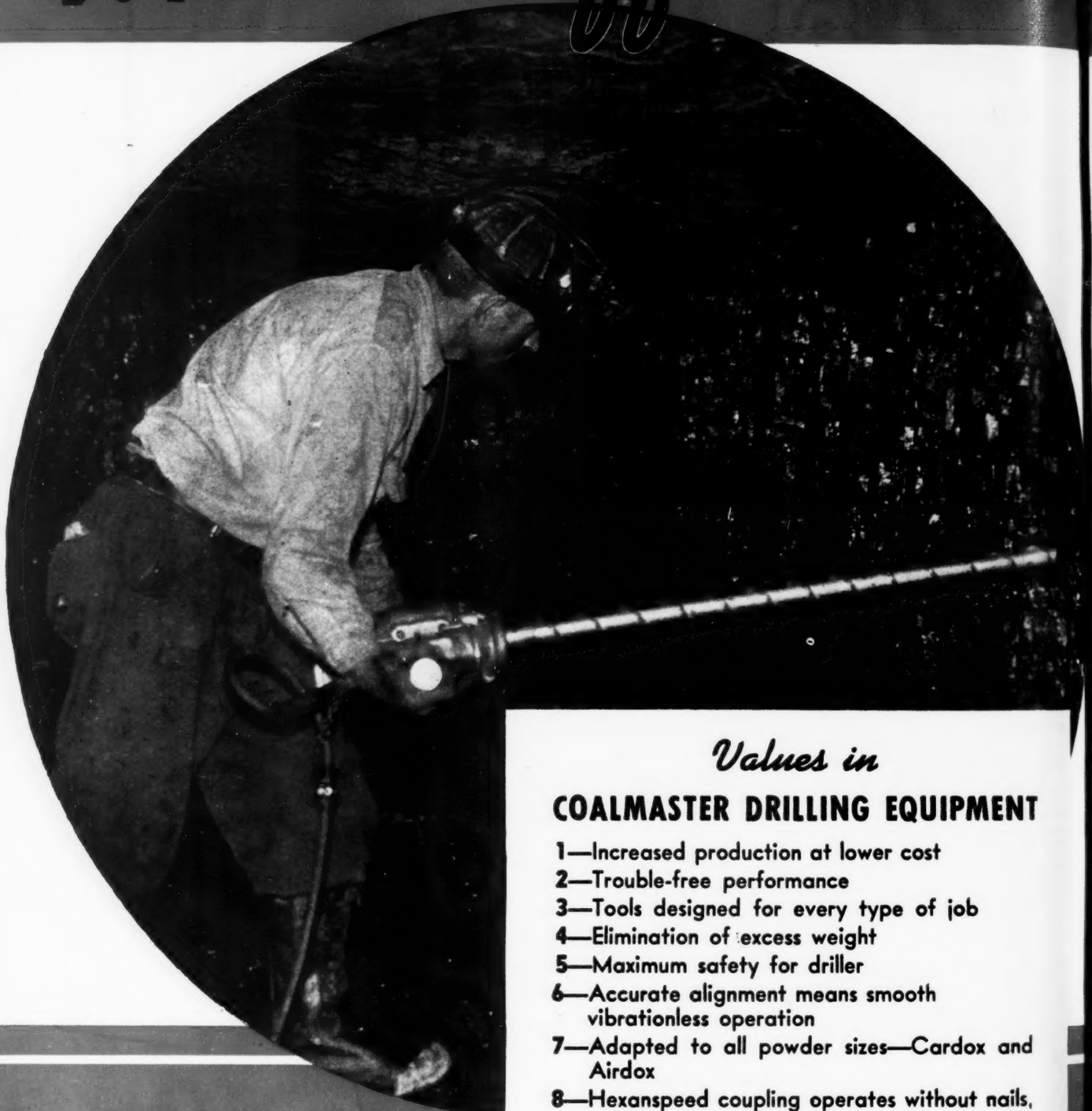
• Maintenance holds a leading place in both this issue (loading machines, p. 56) and in issues to come. Electric-motor upkeep is the subject of a comprehensive and detailed article scheduled for early publication. Also in the box is a short but pithy treatise on keeping pumps in operating trim under war-time conditions.

• Power supply to face equipment is another subject to be treated in various phases in early issues. How to hook up and operate transformers is the subject of one article, while in another George W. Creech will tell how sectionalizing breakers for protecting trolley wires have increased efficiency and reduced hazards.

• Operating features signed up or scheduled include a description of the new Coal Mountain operation of the Red Jacket Coal Corp., to appear in June; loader-shuttle car-belt conveyor work; operation with big cars and transfer hoppers; preparation at a simple but unusual plant; and the methods employed in extinguishing a difficult gob-pile fire.

• Stripping articles on the list for the future include descriptions of modernization work at large operations, as well as examples of efficient operation in the East with small equipment. Safety material now in preparation throws light on how to prevent fires and explosions.

More Efficient



Values in
COALMASTER DRILLING EQUIPMENT

1—Increased production at lower cost
2—Trouble-free performance
3—Tools designed for every type of job
4—Elimination of excess weight
5—Maximum safety for driller
6—Accurate alignment means smooth vibrationless operation
7—Adapted to all powder sizes—Cardox and Airdox
8—Hexanspeed coupling operates without nails, cotters, or hammers
9—All Coalmaster tools are matched sets

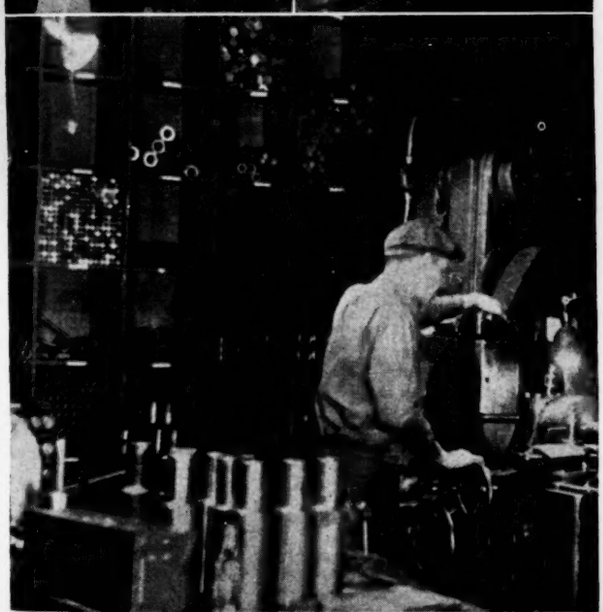
★ Our representatives are drilling specialists—Men trained by experience to select the tools that will meet your particular requirements best. They are anxious to help you solve your drilling problems with the objective of mining coal at minimum cost.

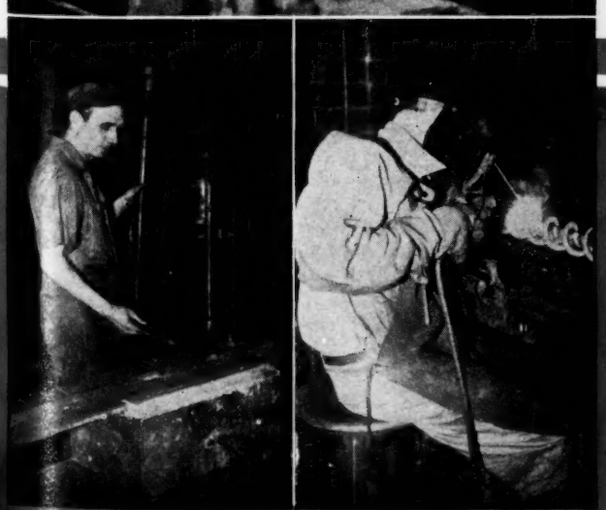
In use across the country

DRILLING

WITH COALMASTER EQUIPMENT

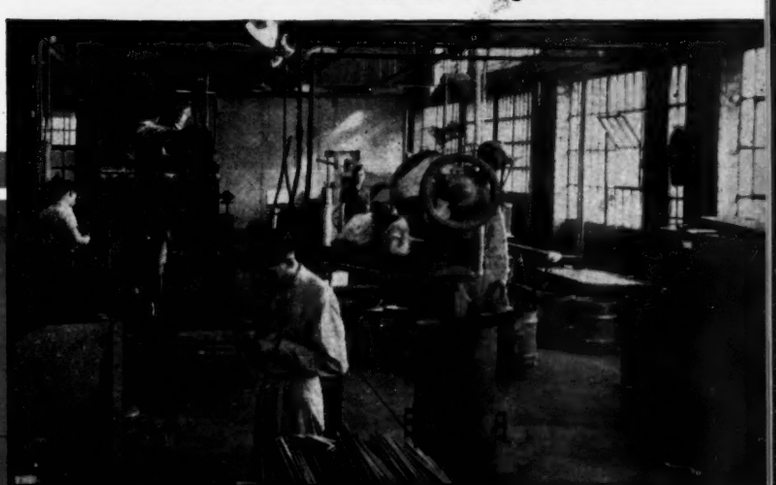
HOME OF
COALMASTER
BLAST HOLE DRILLING
Tools





A Coalmaster tool for every purpose, every condition.

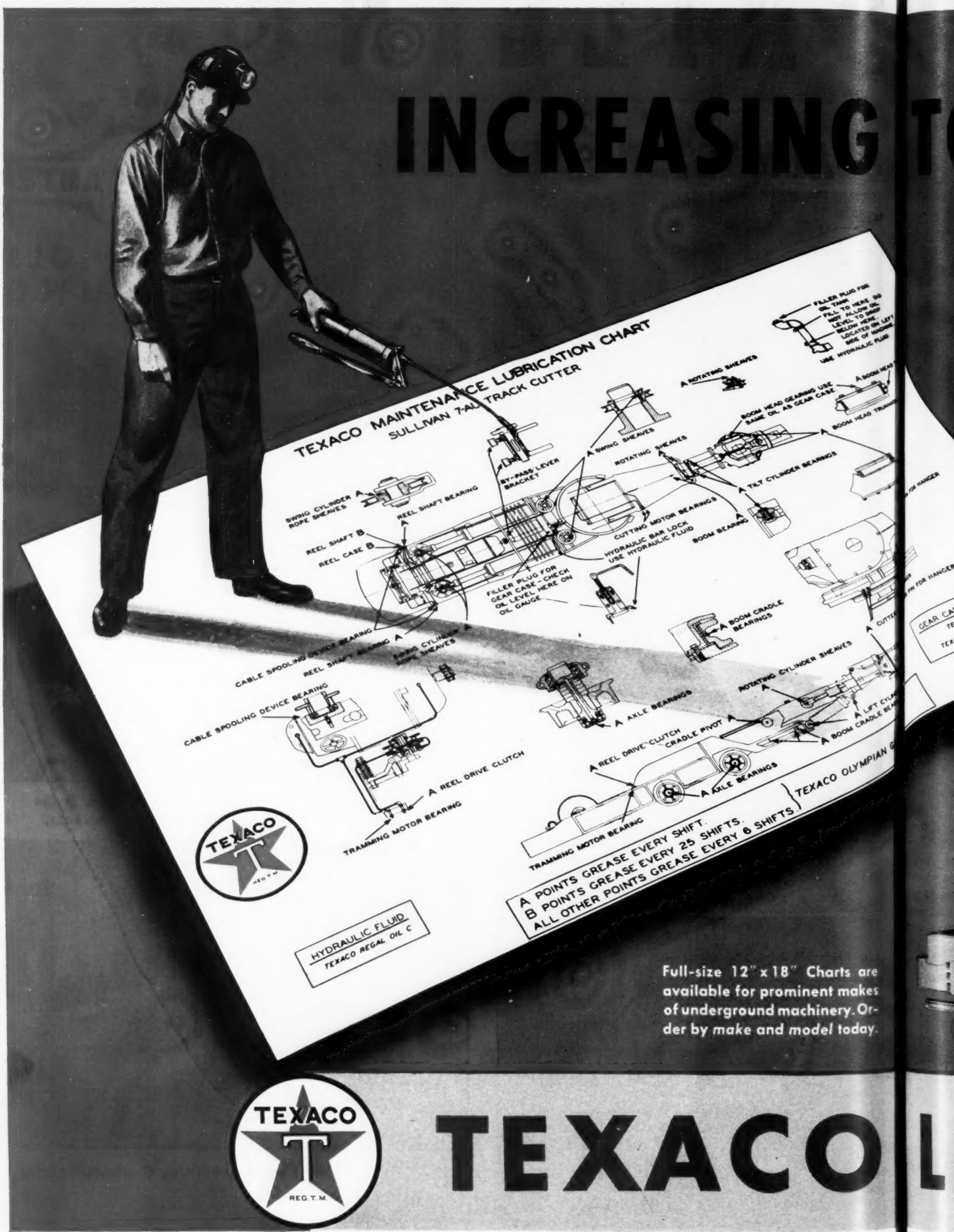
Here is performed the initial operation in the manufacture of Coalmaster auger sockets.



The first step in producing Coalmaster bits.

A Few of Many
PRECISION MANUFACTURING OPERATIONS

CENTRAL MINE EQUIPMENT CO.
ST. LOUIS, MO.


INCREASING
TEXACO MAINTENANCE LUBRICATION CHART
SULLIVAN 7-AU TRACK CUTTER
A ROTATING SHEAVES
A SWING SHEAVES
ROTATING SHEAVES
A BOOM HEAD
BOOM HEAD GEARING USE SAME OIL AS GEAR CASE.
A BOOM HEAD TRANSF
A TILT CYLINDER BEARINGS
BY-PASS LEVER BRACKET
SWING CYLINDER ROPE SHEAVES
REEL SHAFT BEARING
REEL SHAFT B
REEL CASE B
CUTTING MOTOR BEARINGS
HYDRAULIC BAR LOCK USE HYDRAULIC FLUID
BOOM BEARING
FILLER PLUG FOR GEAR CASE - CHECK OIL LEVEL HERE ON OIL GAUGE
A BOOM CRADLE BEARINGS
CABLE SPOOLING CUTTER BEARING
REEL SHAFT BEARING
CABLE SPOOLING DEVICE BEARING
A AXLE BEARINGS
ROTATING CYLINDER SHEAVES
A REEL DRIVE CLUTCH
CRADLE PIVOT
A BOOM CRADLE
A REEL DRIVE CLUTCH
TRAMMING MOTOR BEARING
A AXLE BEARINGS
TRAMMING MOTOR BEARING
A POINTS GREASE EVERY SHIFT.
B POINTS GREASE EVERY 25 SHIFTS.
ALL OTHER POINTS GREASE EVERY 6 SHIFTS
TEXACO OLYMPIAN
HYDRAULIC FLUID
TEXACO REGAL OIL C
TEXACO
REG. T. M.
Full-size 12" x 18" Charts are available for prominent makes of underground machinery. Order by make and model today.
TEXACO
REG. T. M.
TEXACO

TONNAGE by CHART ...not by chance!

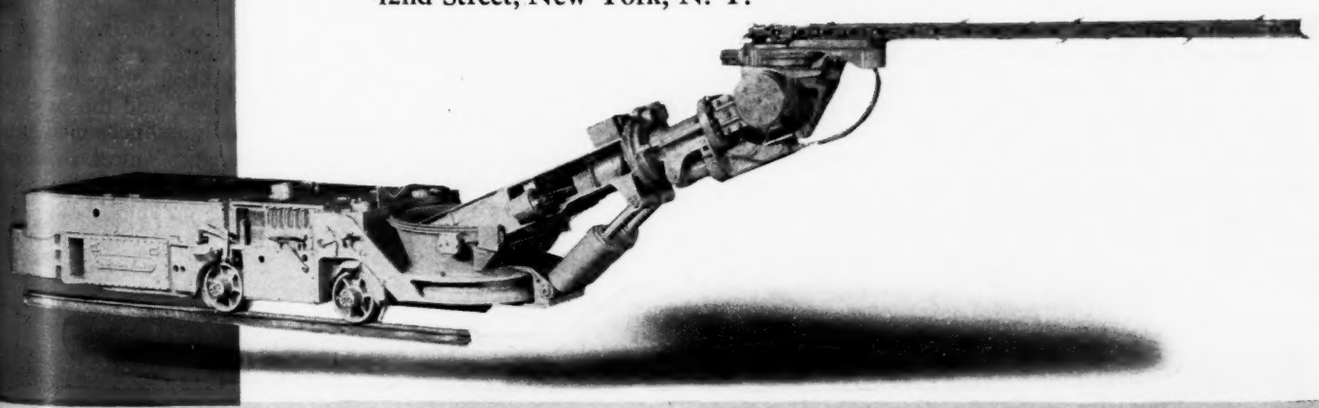
WITH the war calling for increased tonnage from every coal-producing property, each piece of mechanized equipment must be effectively lubricated, and will be when you follow the chart.

As a practical guide to the effective lubrication of your cutters, loaders, locomotives, etc., The Texas Company is providing *Texaco Maintenance Lubrication Charts.*

Designed and developed in cooperation with the engineering staffs of prominent equipment makers, Texaco Lubrication Charts (12″x18″ in size) show at a glance exactly *where, when,* and with *what* type of lubricant to service each and every lubrication point of your cutters, loaders, locomotives... with lubricants approved by the manufacturer.

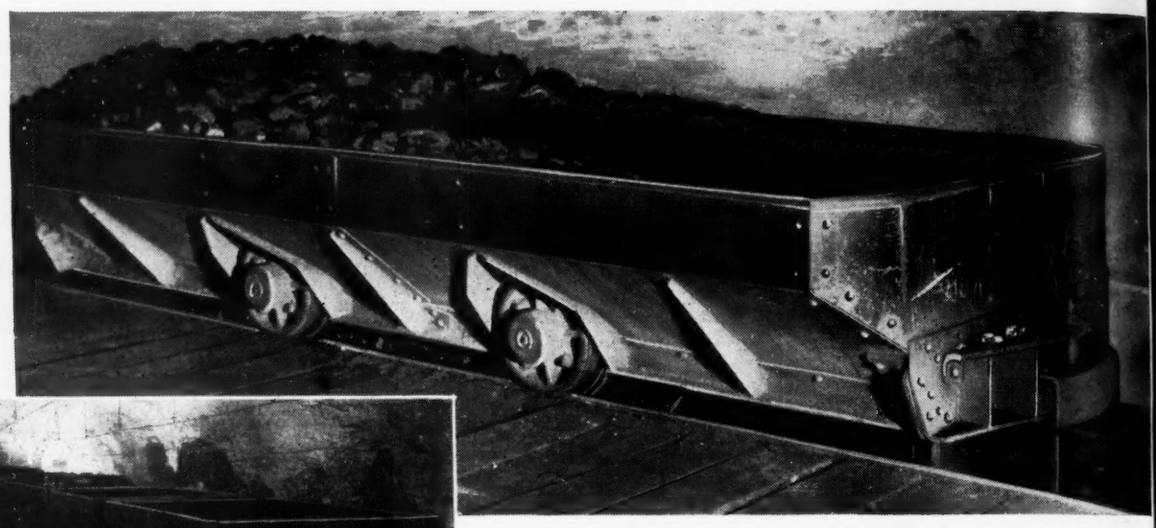
Texaco Charts at all lubricating stations for your men to follow will help to assure maximum service life from your equipment and less time out for repairs. Order by make and model from—

The Texas Company, *National Sales Division,* Dept. C, 135 East 42nd Street, New York, N. Y.



Lubricants FOR THE COAL MINING INDUSTRY

RAILWAY FUEL'S PARRISH, ALA MINE Is a Model For Top Production at Lowest Cost!



Note the 1-2-3 action of doors for laying the coal down easily—saves breakage of coal and wear and tear on car. Photo at left shows the two tracks over 300 ton bin, inside the mine.

Complete change over from Rotary Dump to S-D "Automatic" system accomplished without loss of time or coal production.

For positive proof of the amazing savings and increased production with S-D Automatic bottom discharge mine cars, any operator will be convinced, by simply investigating the change-over from Rotary to S-D "Automatics" at the Parrish, Ala. mine of Railway Fuel Co.—a mine where you will find efficiency, top production and minimum operating cost uppermost in the minds of the management.

In June 1942, 250, six-ton S-D "Automatics" replaced 550, one and three-quarter ton rotary dump cars. Two 12 ton S-D "Automatic" Monitor Cars replaced the two old 6-car Rotary Dumps.

All cars are equipped with S-D "Floater" Ball Bearing Wheels which carry Sanford-Day's liberal guarantee against breakage or bearing failures.

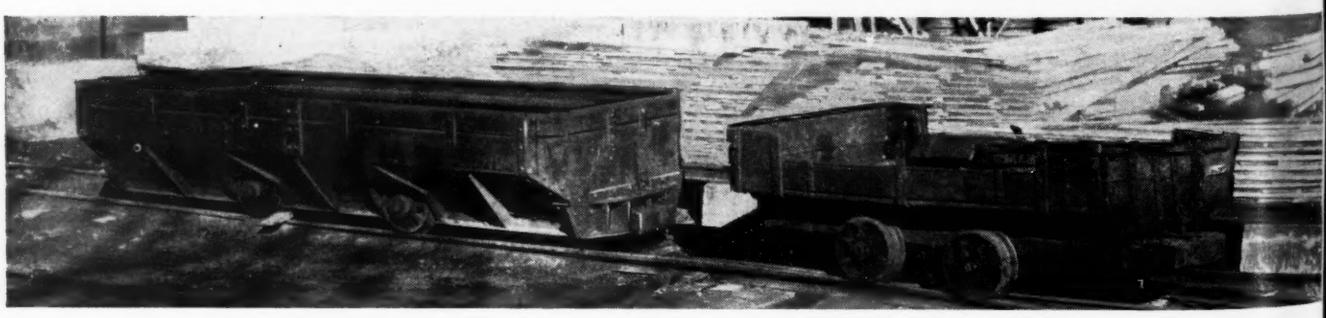
Power savings alone have amounted to as much as 1½ cents per ton of coal produced.

Average tonnage increase with the new cars has been approximately 25 per cent.

It has been predicted, and conservatively so, that the cash savings in production cost will pay for the complete change-over, including mine cars, monitors, 300 ton bin, installation labor, and incidentals, in from 1½ to 2 years. This means, assuming that the mine cars bear the total change-over cost, that the savings will pay for one car about every two days.

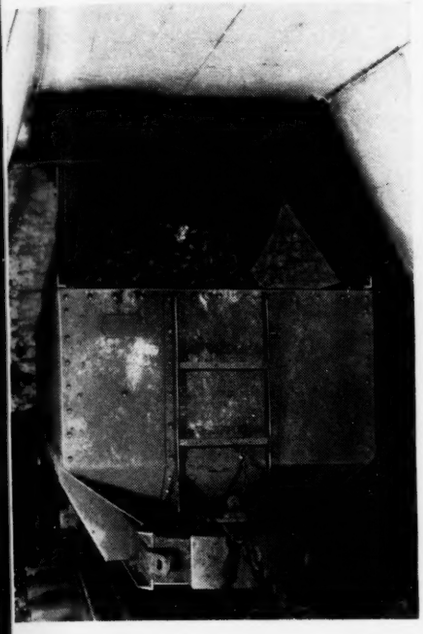
Savings in cost, savings in manpower, and top production are all vital requirements today. Railway Fuel's modern mine is proof of how S-D 1-2-3 "Automatics" meet these conditions. Although this mine is an excellent example, it, nevertheless, is typical of what is being accomplished in other mines and what can be done for most any wide awake operator.

Photo below shows one of the old 1¾ Ton Rotary Cars compared with new 6-Ton S-D "Automatic."



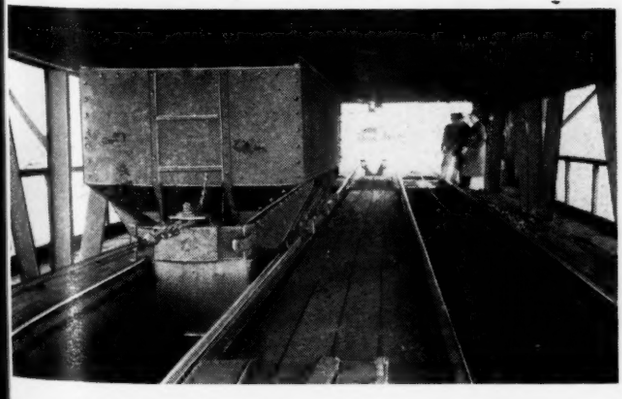
It is case histories like this one that are convincing so many operators that the S-D "Automatic" is essential to greatest production of coal at minimum costs and with minimum man power.

Every S-D "Automatic" is built special to exactly fit the need of the particular operation it must serve. Dimensions, capacities, loading problems, distances of haul, and many other conditions are involved. The one feature of the S-D "Automatic" that always is standard . . . that accounts for most of its advantages, is the exclusive S-D 1–2–3 method of discharging the coal. The coal is not dropped with a crushing blow. It is layed down gently, through one door at a time, while car is in motion. The car is not subjected to the rough treatment of other types of cars. The S-D "Automatic" leads the easiest life of any car available.

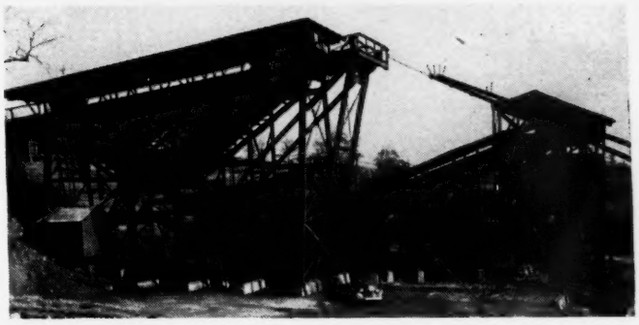


An ingeneous loading gate developed at mine and automatically operated by monitor under 300 Ton bin at the end of 950 ft. slope.

One of the two 12 Ton S-D "Automatic" Monitor cars coming out of mine.



Monitor Car discharging coal automatically at tipple.



Tipple where the two 6-car Rotary dumps were discarded for "Automatic" monitor car operation.

Mr. L. A. Michael, Supt. of Railway Fuel's Parrish mine, is recognized as a man of exceptional management ability. The facts of his experience with S-D "Automatics" are, in his own words, as follows:

L. A. Michael, Supt.

"Since changing over our mine at Parrish, Alabama from Rotary cars to S-D 1-2-3 'Automatics', I can assure you that these new cars have accomplished even more than you claimed for them in savings and in increased production."

"No one can understand how difficult it was to change from Rotary-dump cars to Drop-bottom cars unless he was familiar with our set-up here at Railway Fuel Company."

"Our slope has a 30 degree pitch and is 800 feet long. At the lower end or level there were three tracks. This was our inside yard. The coal was brought to this point from all sections of the mine and drawn up the slope to the rotary dump, six cars at a trip, by a 400 H.P. double drum electric hoist."

"To make the change for S-D 'Automatic' cars, we extended the slope 150 feet on the 30 degree pitch. At the end of the extension this put us 50 feet below the three tracks. We then drove up to the tracks and developed a storage bin that holds 300 tons of coal."

"All this work was accomplished without the loss of a day's time or the loss of a ton of coal. We also completed the job without a lost-time accident."

"The change from the 1¼ ton rotary-dump cars to the 6-ton S-D 1-2-3 'Automatic' cars was made to speed up production. and we are well pleased with the results."

"These cars have been in operation since June 15, 1942. long enough for us to know just what they can do, and I am glad to recommend them to other operators."

"This same satisfaction applies to the two monitor cars which replaced our old six-car Rotary dump."

This story published through the courtesy of Railway Fuel Company. More complete details will be furnished upon request to Sanford-Day Iron Works.

Sanford-Day Iron Works

KNOXVILLE • TENNESSEE

From Face to

with GOODMAN SHAKER

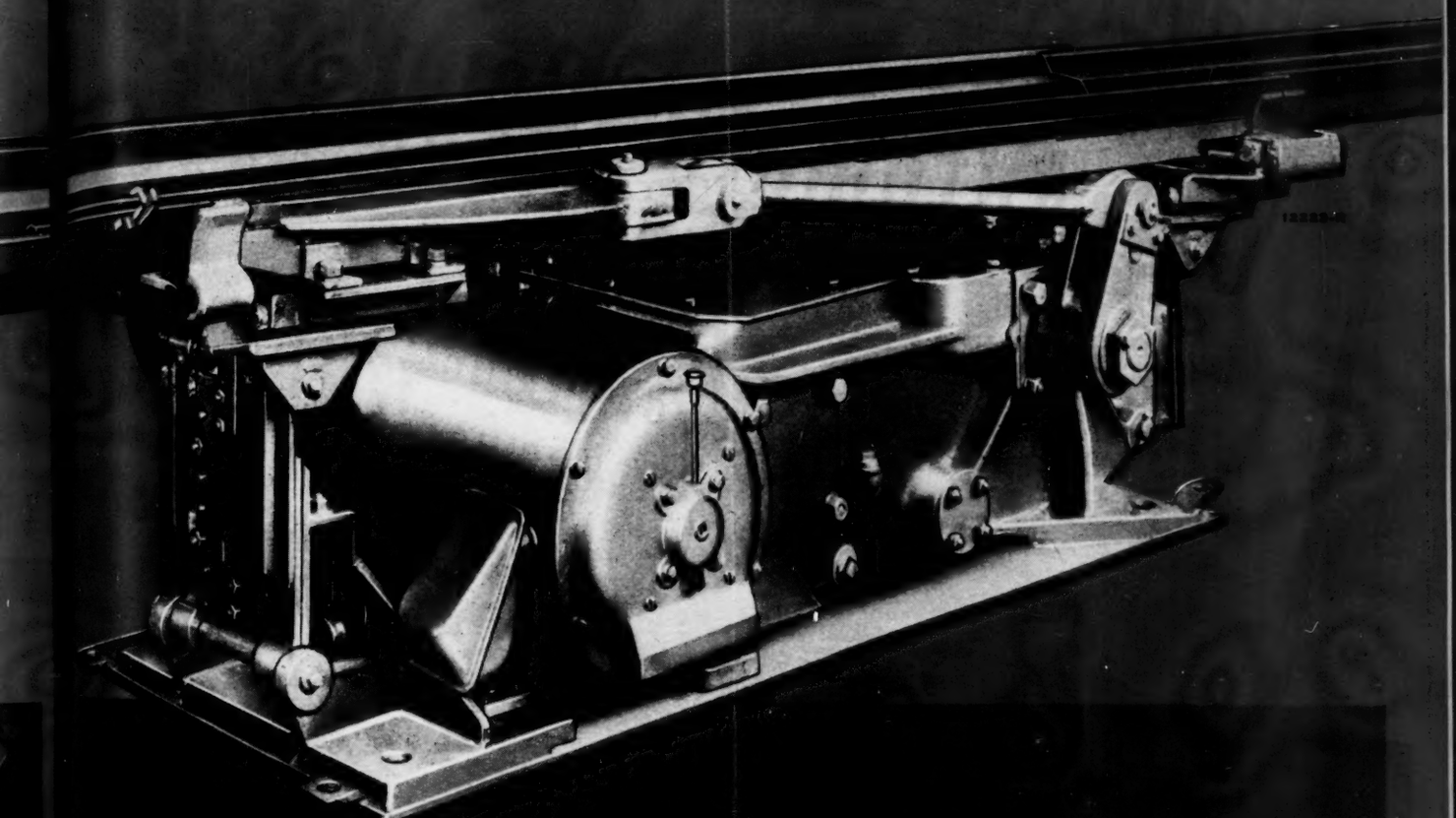
Complete, rapid loading at the face with the automatic Duckbill . . . a smooth, continuous flow of coal to the entry in the pan line . . . both functions powered by the forward and return strokes of the drive unit. A combined loading and transporting system that saves time, conserves man power and means more tons per shift.

13301-R

11345-R

GOODMAN MANUFACTURING COMPANY

Haulage Entry
CONVEYORS *and* DUCKBILLS



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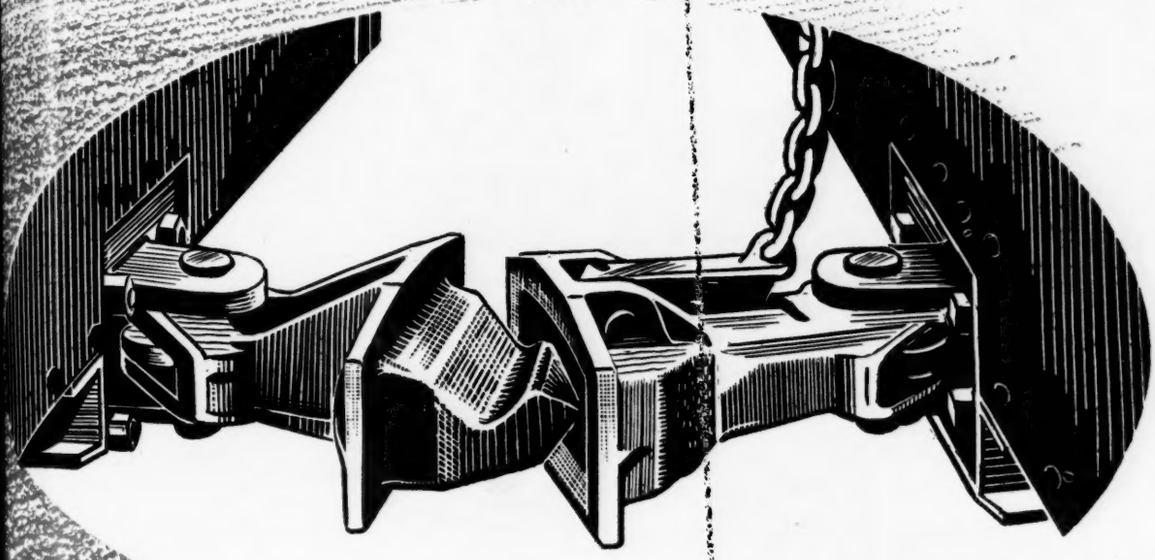
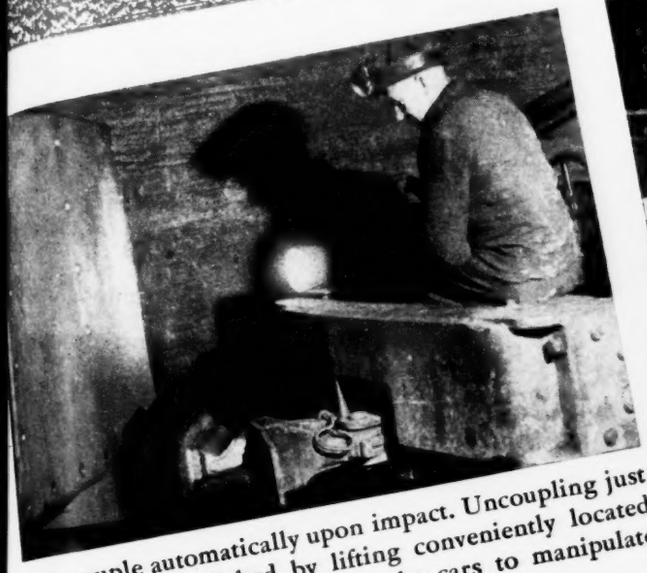
HALSTED STREET AT 48TH • CHICAGO, ILLINOIS





Cars couple automatically upon impact. Uncoupling just as easily accomplished by lifting conveniently located lever. No need to go between the cars to manipulate treacherous link and pin hitchings.

Faster handling under the loader. Fewer car changes are necessary with large capacity mine cars.

Ohio Brass

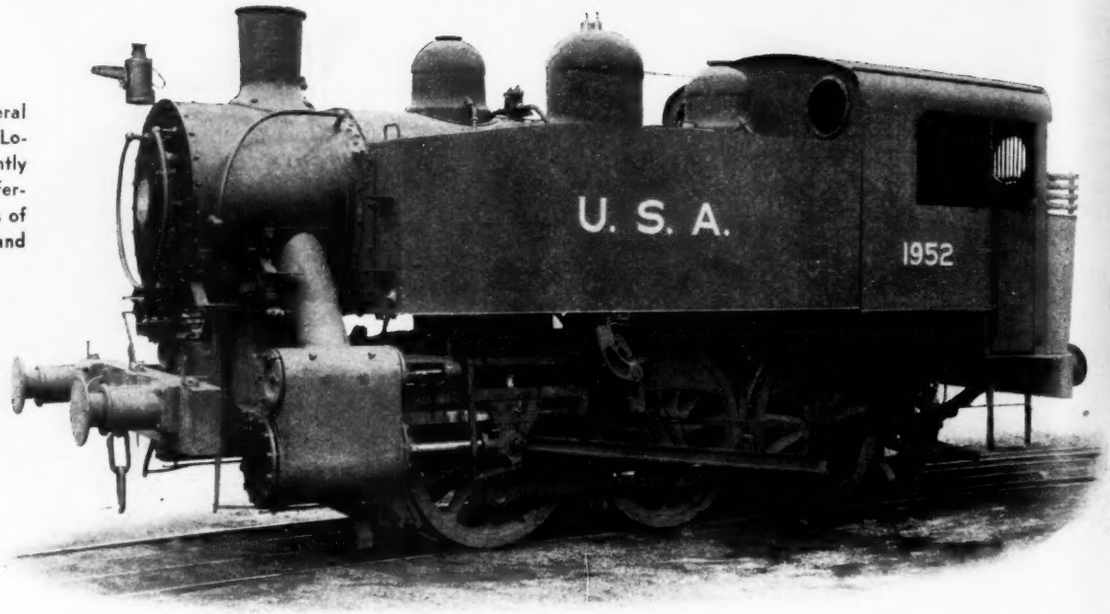
MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

WRITE FOR BOOKLET NO. 676 AM

2374 AM

One of the several types of Vulcan Locomotives recently furnished to different departments of the U. S. Army and Navy.



"IRON HORSES" for the S. O. S.

America is proud of her planes, tanks and other front-line fighting units — now blazing through to victory on so many far-flung battle fronts. For them, and for the brave men who operate them, all free people must be eternally grateful.

Total victory depends equally, however, upon our SERVICE OF SUPPLY and its ability to transport a tremendous tonnage of food, munitions, and countless other materials from landing ports to advanced bases. For hauling these heavy loads, behind the fighting lines, steam locomotives are still supreme and are being utilized as extensively as possible.

Many Vulcan locomotives have already been delivered to the Allied armed forces and we are working at top speed to furnish more. Government authorities realize, however, that coal and ore production must be maintained and are still permitting us to supply mining companies with a limited amount of urgently-needed equipment. Inquiries which come within this scope are cordially invited and will receive immediate attention from our experienced engineering executives.

VULCAN IRON WORKS

ESTABLISHED 1849

WILKES-BARRE • PENNA. **New York Office • 50 Church St.**

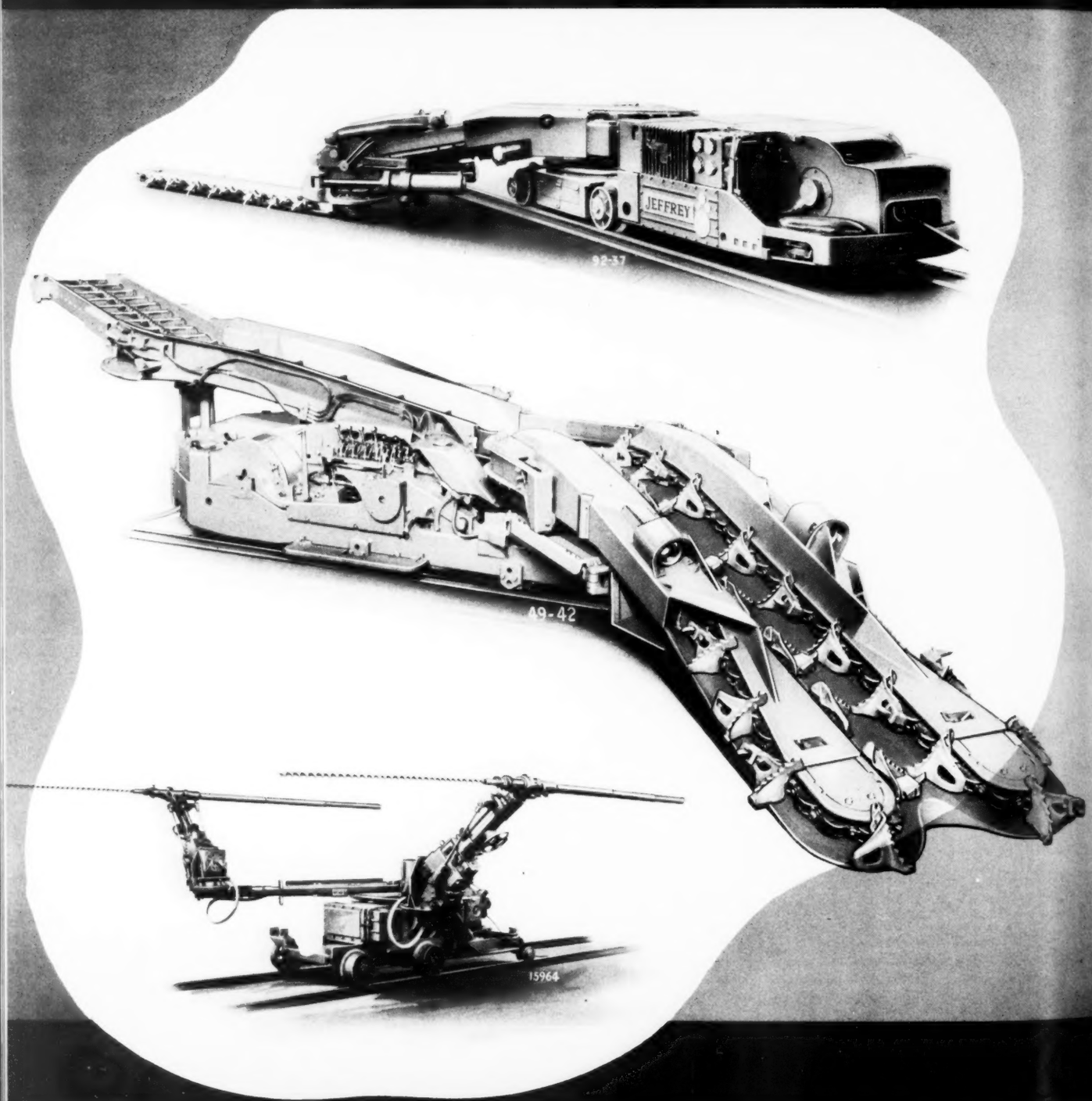
Steam Locomotives	Heavy-Duty Electric Hoists	Shaking-Chute Conveyors	Load-Carrying Larries
Electric Locomotives	Steam Hoisting Engines	Chain Conveyors	Rotary Kilns, Coolers and Dryers
Diesel Locomotives geared and electric drive	Self-Contained Hoists	Sheaves, Pulleys, etc.	Improved Vertical Kilns
	Scraper Hoists	Cages, Skips, Gunboats	Quick-Lime Hydrators
Gasoline Locomotives geared and electric drive	Car-Spotting Hoists	Coal-Preparation Equipment	Ball, Rod and Tube Mills
	Room Hoists	Iron and Steel Castings	Roasters, Calciners, Retorts, etc.

JEFFREY
EQUIPMENT for MECHANIZED MINING

DRILLS
CUTTERS
LOADERS
CONVEYORS
FANS
LOCOMOTIVES
BLOWERS
JIGS
CRUSHERS
SCREENS
RENEWAL PARTS

BELOW AND ABOVE GROUND
FROM FACE TO RAILROAD CAR

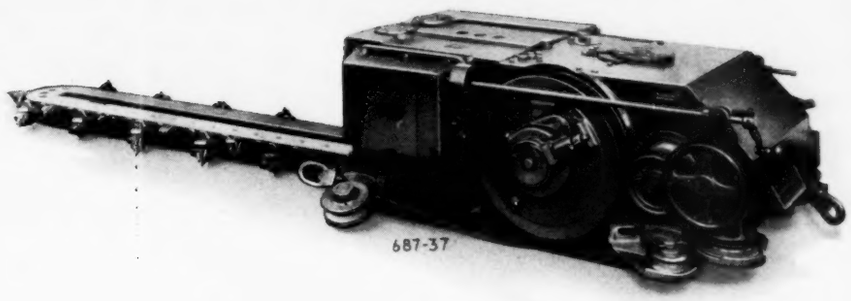
Mechanization

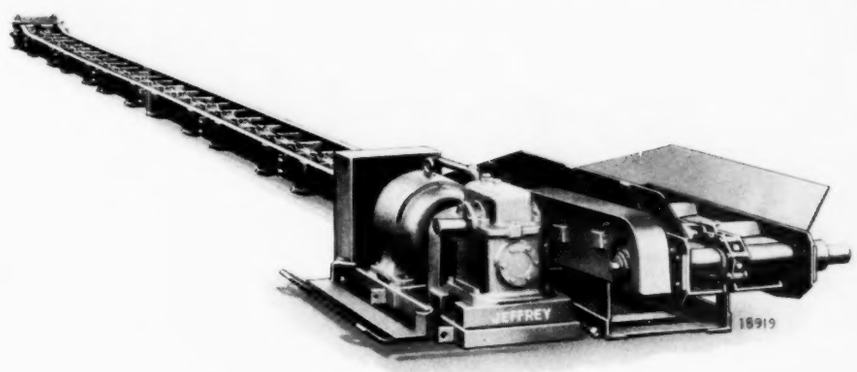


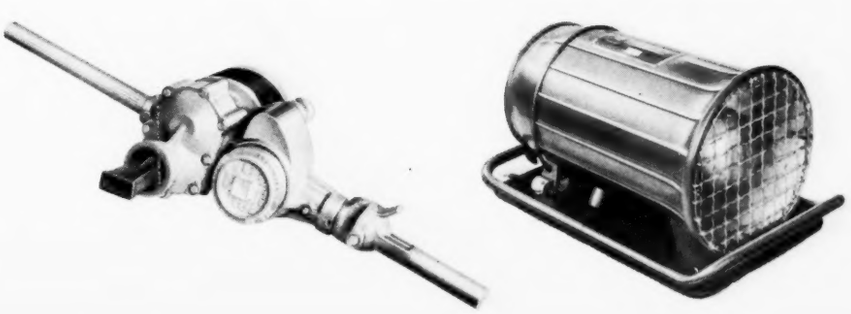
The Jeffrey "BIG THREE" simplifies the problem of efficient machine-grouping for a continuous cycle of production. Jeffrey 29-U Cutter, 56-A Driller and L-600 Loader (shown at left) . . all track-mounted, all highly flexible. In range, speed and capacity, they're adapted to *work together.*

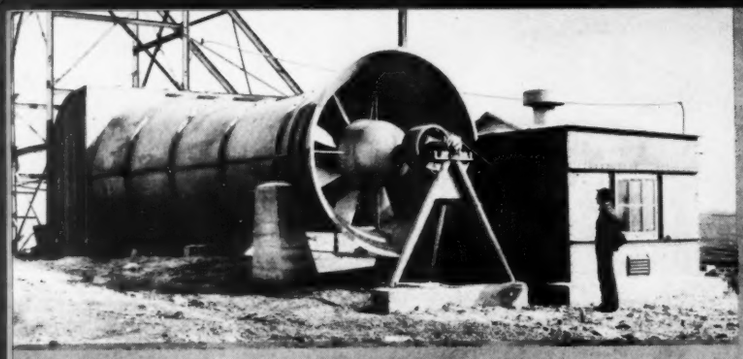
Track-type coal cutters—Patented and Patents Pending. Also licensed under E. C. Morgan Patents Nos. 1706961 — 1706962—1707132—1707133 —1953325—1953326.

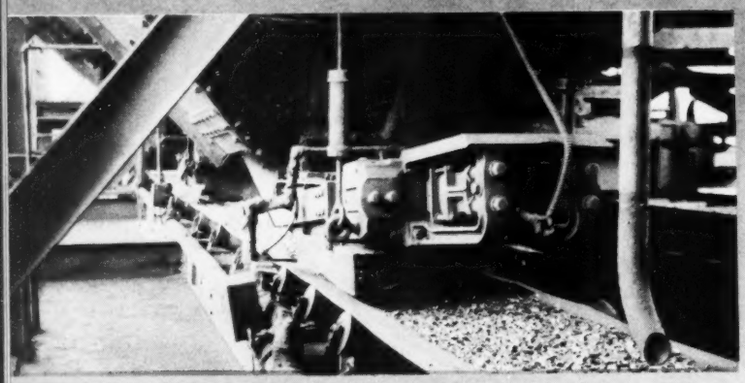
The equipment shown at the right was designed for the lower coal seams. It includes: The Jeffrey 35-B series of coal cutters; the Jeffrey line of chain-type conveyors; Jeffrey A-7 drill, and a Jeffrey Aerodyne Midget blower. These are just a few of the units Jeffrey has available for complete mechanization of your mining operations.

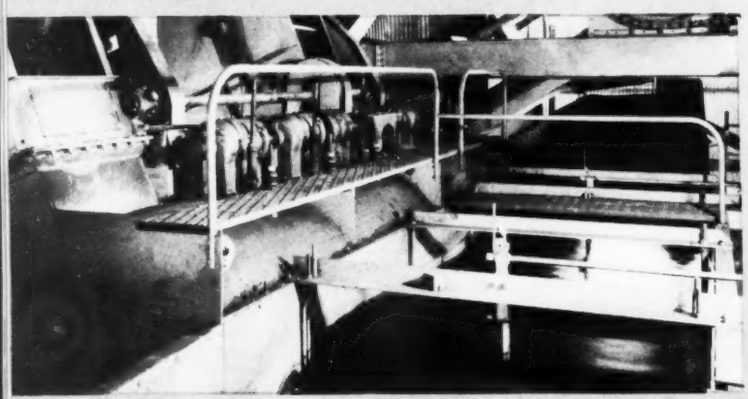












AND

ABOVE GROUND

USE

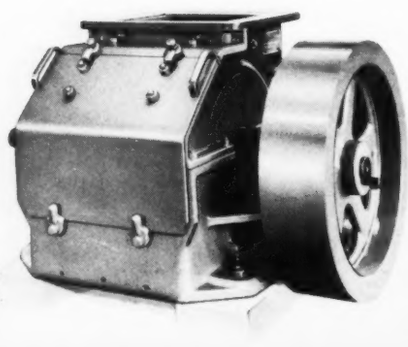
JEFFREY

EQUIPMENT

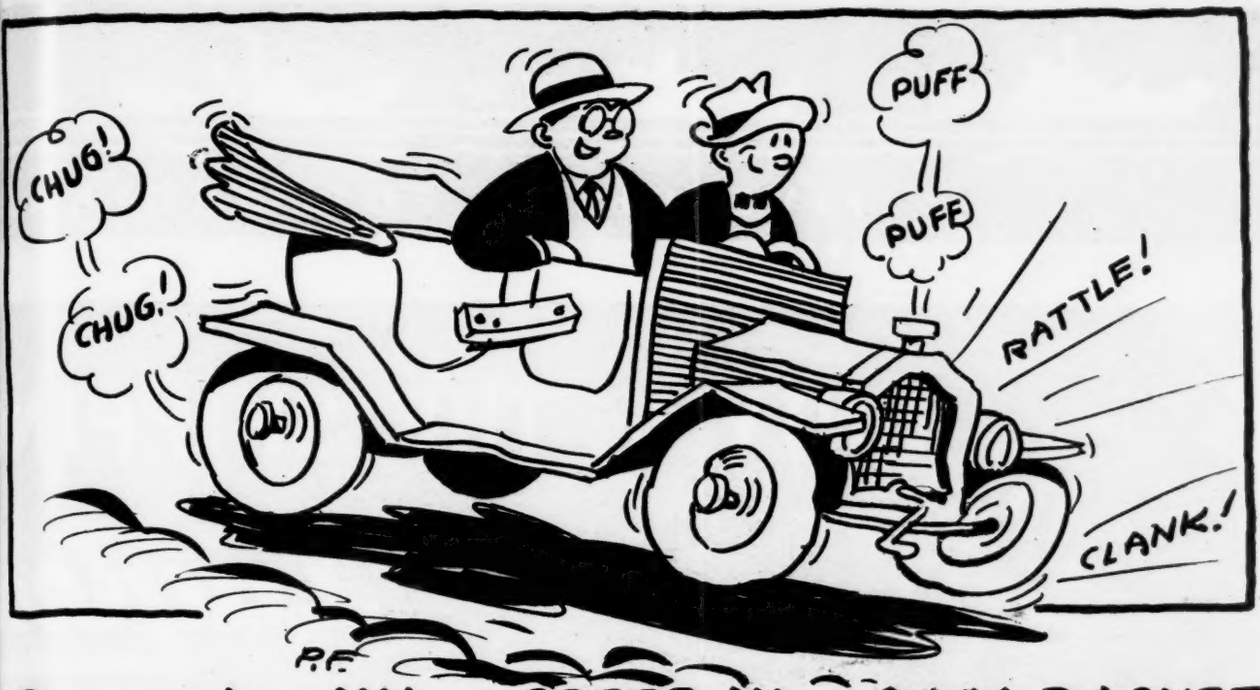
Jeffrey equipment service extends to the tipple and to storage systems at the mines . . to coal and ashes handling in the power plant . . to conveyor methods of unloading and loading coal at docks or in wholesale and retail coal yards. It includes ventilating fans for providing an abundant supply of fresh air in the mines.

Some of this equipment is shown. Feeding, conveying, sizing, screening, washing and ventilating . . Jeffrey has efficient units to do them all . . to complete your production job once the coal is out of ground. Also a complete line of replacement parts for both below and above ground requirements. The quality of these Jeffrey genuine replacement parts is in itself a guarantee of future satisfaction.

New Jeffrey "FLEX-ROLL" Crusher



A small, inexpensive unit for auxiliary use and for small capacities. Ideal for taking oversize coal



Remember When SPEED Was 90% RACKET

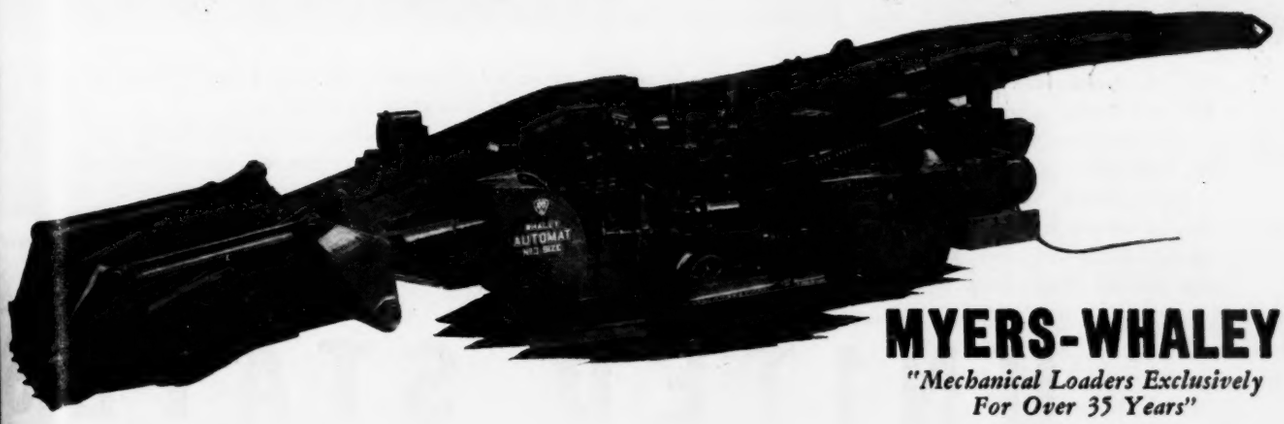
★ At 20 per, the old "can" ripped and snorted and the racket made you swear the speedometer was haywire. But now, touch the throttle of the average car and its powerful, smooth running mechanism steps out at a mile a minute with no more noise than the quiet purr of the engine.

It's easy to misjudge the production of machines too, if you let noise and racket fool you. Take mechanical coal loading machines for example. Don't be fooled by unconsciously thinking that the one that makes the most racket will produce the most tonnage.

The Whaley "Automat"—with its exclusive shovel action; with its extra wide volume-conveyors, runs so smoothly and easily that it looks slow. But watch the cars behind it; watch the steady flow of coal at an average rate of three tons per minute; check the tonnage on one, two, or three shift operations per day and you'll discover why operators who produce maximum tonnage at the least cost per ton depend upon the Whaley "Automat" to get that tonnage.

It's the smooth, easy, volume-production running of the "Automat" that saves wear and tear—holds maintenance to the minimum, and gives constant unbroken service. You can depend upon it!

Don't let noisy, racket making machines fool you about production. It's the tons of coal per shift at lowest cost that counts. Watch the mines that use the Whaley "Automat". Myers-Whaley Company, Knoxville, Tennessee.



MYERS-WHALEY

"Mechanical Loaders Exclusively For Over 35 Years"

ONE SHIP FOR
U. S. LAYTEX ASSAULT WIRE

NG SPACE REQUIRED FOR
ASSAULT WIRE

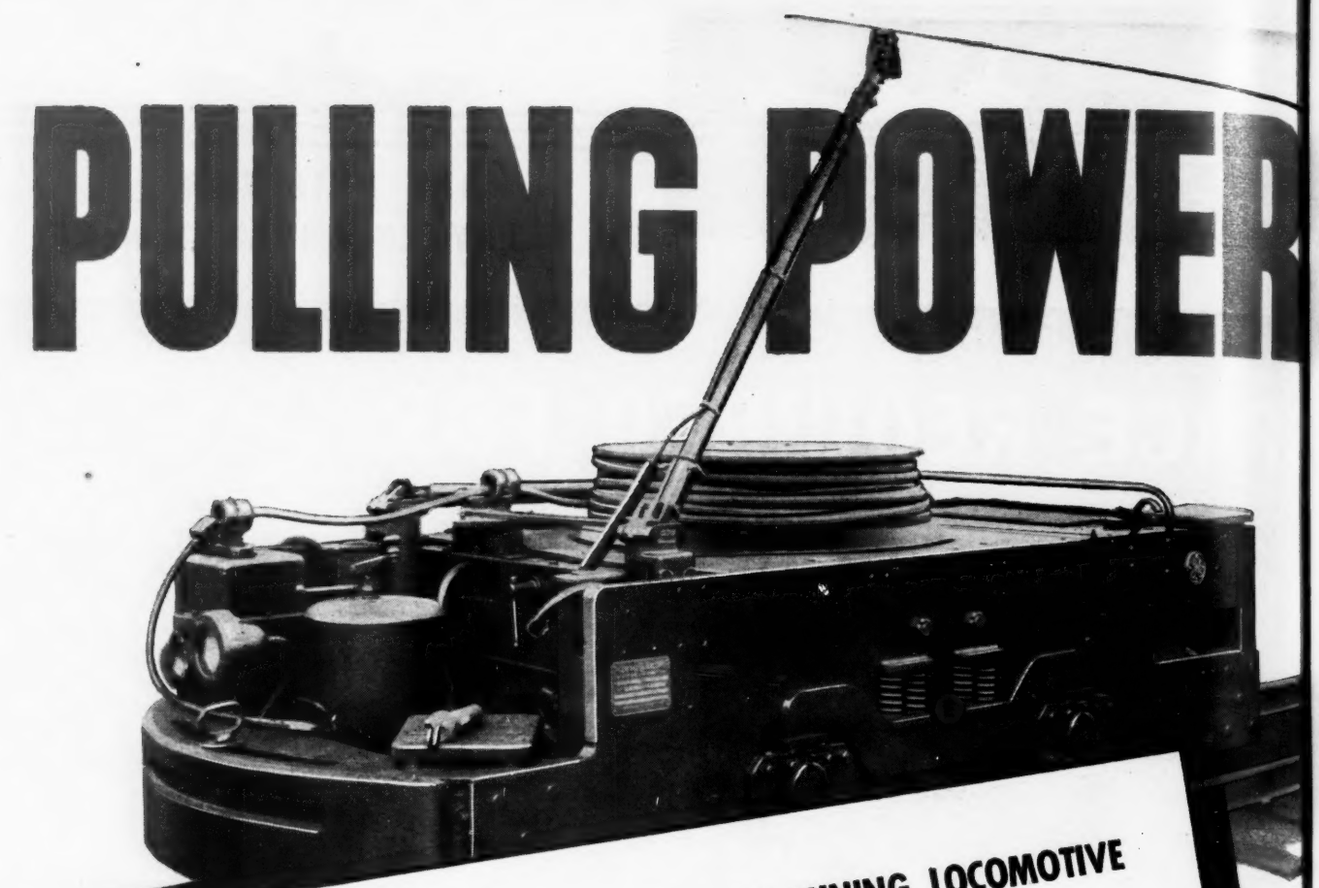
Laytex
REG. U. S. PAT. OFF

ASSAULT WIRE MEETS EVERY
BASIC MILITARY REQUIREMENT

ckefeller Center • New York

RUBBER COMPANY

PULLING POWER



G-E 8-TON "SEALED-EQUIPPED" MINING LOCOMOTIVE

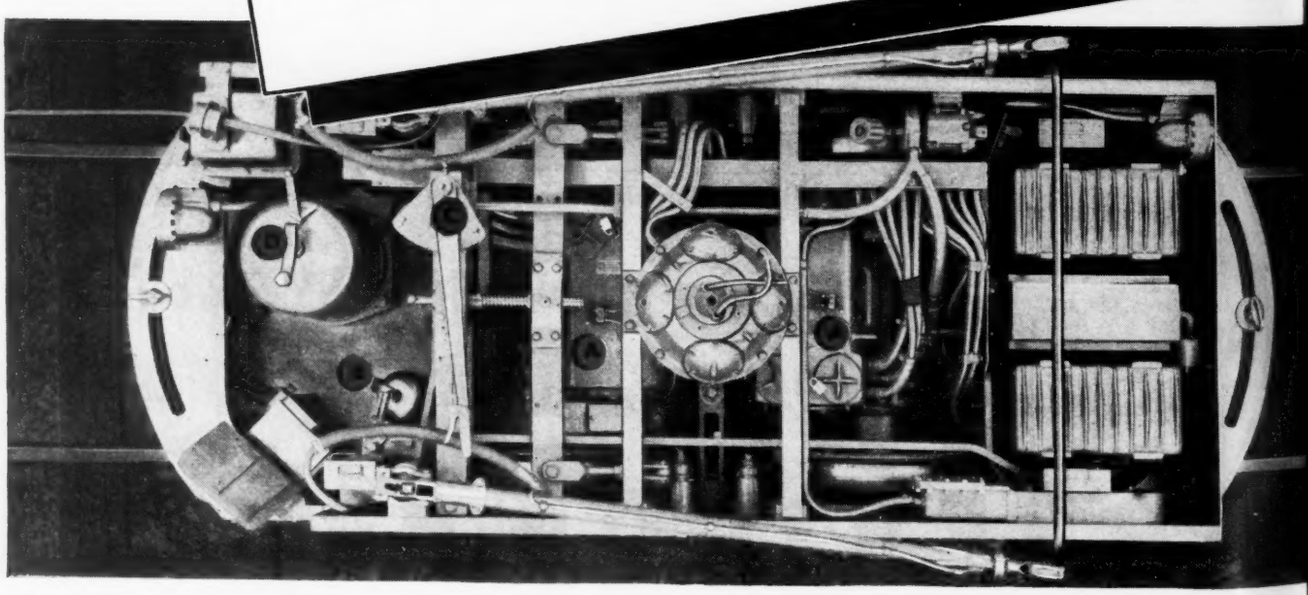
A. Motors centrally hung for good balance

B. Ample space for operator

C. Quick-acting lever brake, easily adjusted

D. One-hand reversing and plugging controller—readily accessible for inspection

E. Side-equalized coil-spring suspension—good balance—stays on the track



to Speed up

NEW BITUMINOUS TONNAGE

G-E 8-ton unit with electric cable reel

Facing the necessity of opening new bituminous mines quickly and safely with limited man power, you'll find General Electric's popular 8-ton "sealed-equipped" gathering locomotive offers definite advantages in:

Continuous "On Track" Performance

Security in Gassy Areas

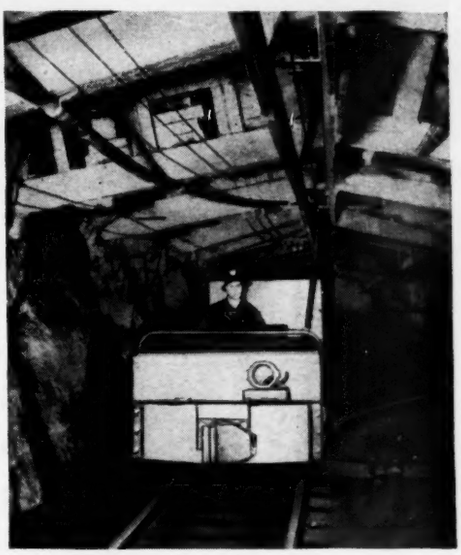
Low Servicing and Maintenance Costs

This locomotive is of explosion-proof construction. Its centrally hung motors and side-equalized coil-spring suspension produce fine balance, eliminate teetering, track pounding, derailments.

The unit's quick-acting lever-brake and single-hand controller mean faster, more accurate spotting of cars and locomotive, give added assurance of a continuous supply of empty cars at the mine face.

The long service life built into bearings, motors, controller, and cable-reel equipment results in lower maintenance cost and less time out for servicing.

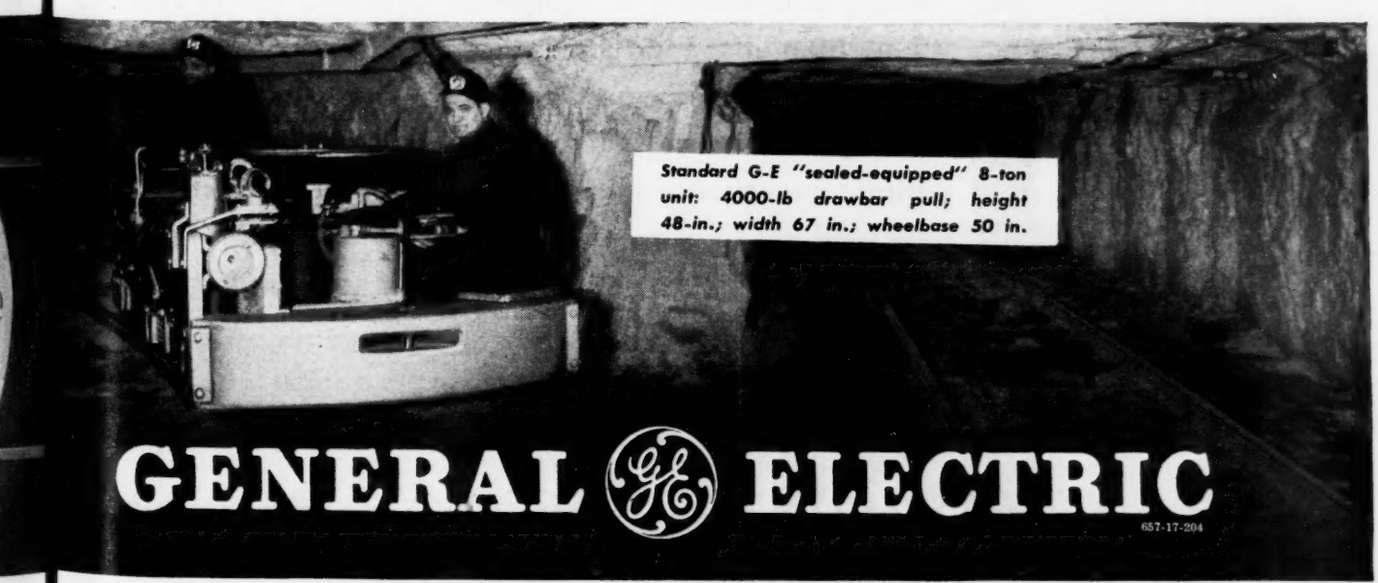
Performance? Repeat orders from three large operators for 97 sealed-equipped locomotives tell the story. So does the preference of the entire industry, which is installing almost as many locomotives of this type as all others combined. *General Electric Co., Schenectady, N. Y.*



G-E 8-ton mine-type trolley locomotive

WHATEVER YOUR CONDITIONS

THERE'S A G-E LOCOMOTIVE TO MEET THEM



Standard G-E "sealed-equipped" 8-ton unit: 4000-lb drawbar pull; height 48-in.; width 67 in.; wheelbase 50 in.

GENERAL ELECTRIC

657-17-204

THE *Punch* OF STEAM POWER

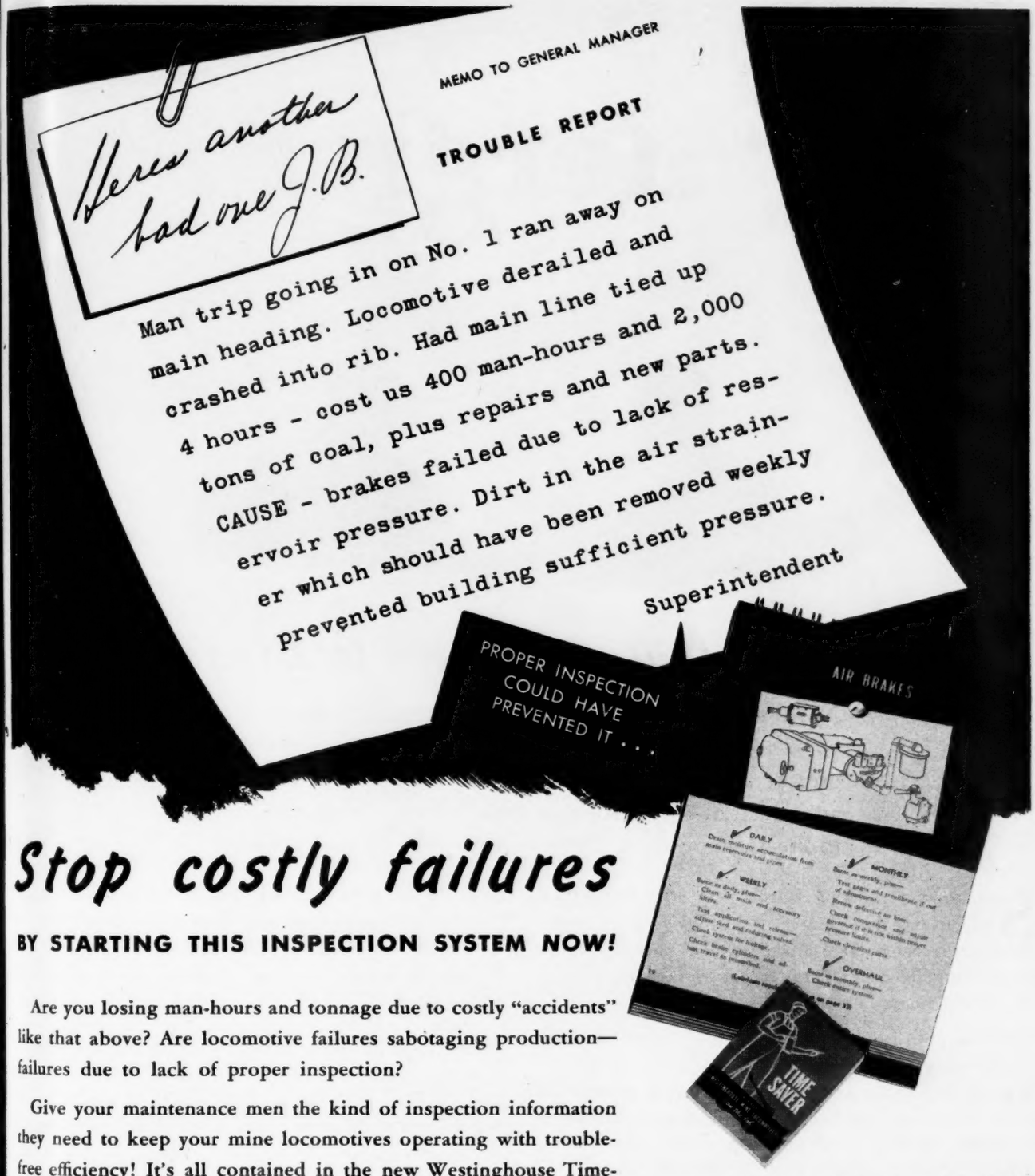
Here the 2-Cycle Diesel (right) teams up with an Allis-Chalmers gas tractor to speed a coal stripping operation for L. M. Hutchinson, Mount Union, Pa.

The way it purrs in tough going, smoothly, quietly with heavy loads . . . the way it easily handles these big loads with little or no shifting of gears . . . the way it quickly picks up top speed — the 2-Cycle Diesel reminds you of steam power . . . about as close a comparison as you can make with this modern power! No other Diesel tractor performs like it! Handles your stripping, roadbuilding, cleaning-up, hauling and moving of equipment at a new low in cost . . . a new high in speed. Starts instantly, too — no need to let it idle when not in use. Has the stamina to work thousands of tough hours without babying and constant attention, without overhaul or major repairs. Get all the facts on this new kind of Diesel power! Write for literature.

ALLIS-CHALMERS, TRACTOR DIVISION, MILWAUKEE, U. S. A.

ALLIS-CHALMERS

2-CYCLE DIESEL . . THE *Modern* POWER



Stop costly failures

BY STARTING THIS INSPECTION SYSTEM *NOW!*

Are you losing man-hours and tonnage due to costly "accidents" like that above? Are locomotive failures sabotaging production—failures due to lack of proper inspection?

Give your maintenance men the kind of inspection information they need to keep your mine locomotives operating with trouble-free efficiency! It's all contained in the new Westinghouse Time-Saver Guide.

Get copies for your men now! The simple and thorough inspection system it outlines can save you many production headaches. Westinghouse Electric & Mfg. Company, East Pittsburgh, Penna.
J-15076

TYPICAL of the practical information in the Time-Saver Guide is this page on Brake Inspection. Use of this system could have prevented the costly failure reported above.

SEND TODAY for as many copies of this book as you need for your men. Write Dept. 7-N; ask for Booklet B-3150.

Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

MINE LOCOMOTIVES

A $10 Word *that gets down to Brass Tacks*

No, synergism is not a new word. It is an old word, with the basic meaning—"forces working together to produce a whole greater than the sum of the parts." Lately it has developed an industrial connotation of "minds stimulating each other to create more than the sum total of the ideas expressed."

SYNERGISTIC thinking is the next step beyond co-operation—the creative step that evolves better methods, more effective processes, new materials, faster production, finer products. It has worked miracles in war production.

But synergism is not confined to huge achievement. On the contrary, synergistic thinking is responsible for the little creations that pave the way for bigger accomplishment. Wherever you find minds stimulating each other to action, there you will find progressive steps—big or little.

Sometimes it takes the form of a crude, but functioning apparatus—a rough sketch—an immature product. It is as likely to be the brain-child of skilled workmen as of Ph.D's. Perhaps it developed from a discussion across a desk or around a machine. But always it represents the impact of minds "clicking" together for a practical creative result.

Industry—from top to bottom—is learning that synergism speeds progress, raises standards. The war is a good teacher. Here at Atlas, we have practiced synergism in our spheres of chemical production to gain some notable results in collaboration with our customers. We would like to show you what synergistic thinking may accomplish for any problems of yours that may lie within our scope.

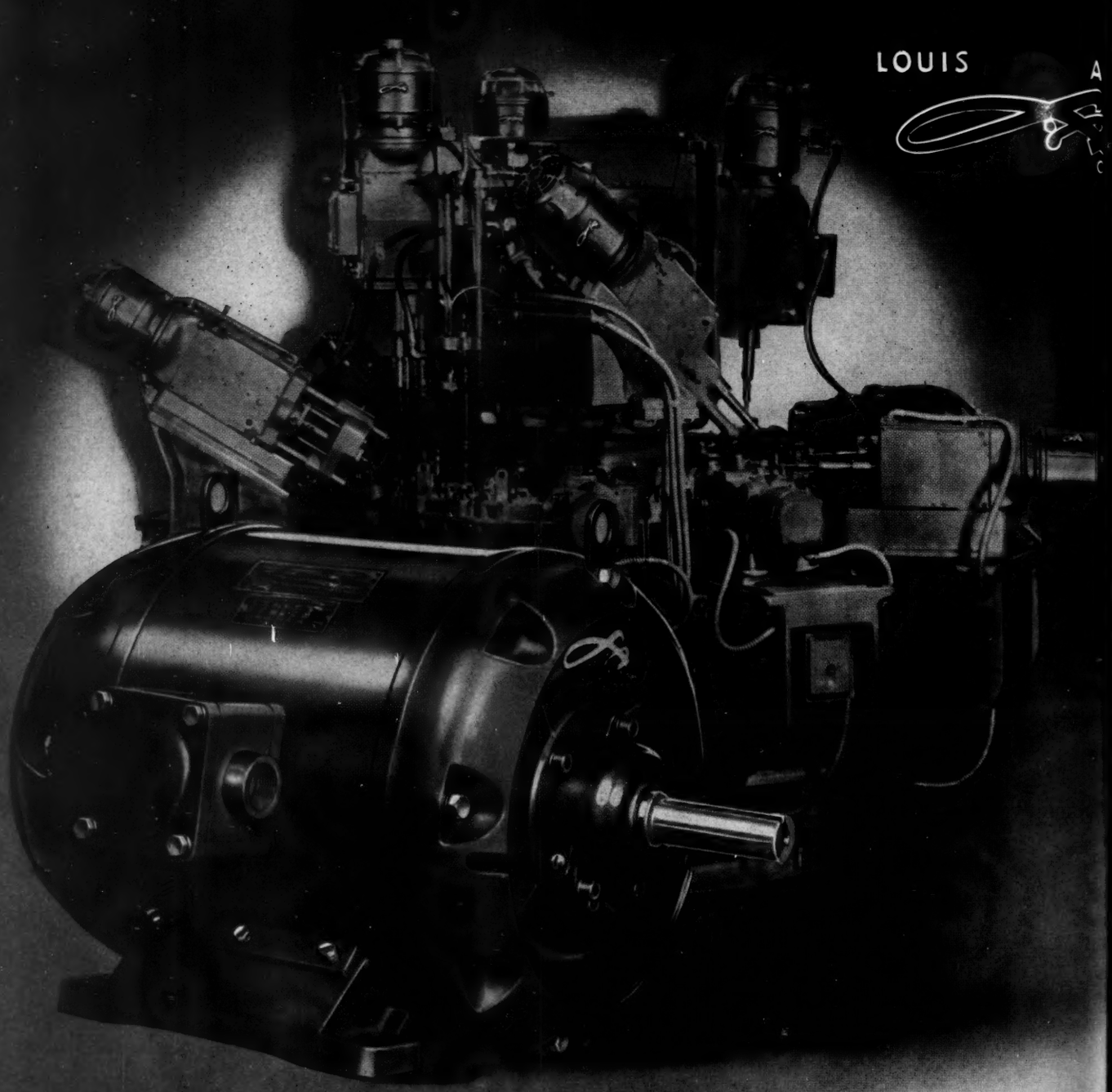
CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY
WILMINGTON, DELAWARE
Offices in Principal Cities

Industrial Explosives • Industrial Finishes • Coated Fabrics • Acids
Activated Carbons • Industrial Chemicals • Ordnance Materiel

As never before in History···
The American Red Cross urgently needs
Your Moral Help··Your Money··Your Time··
and Your Blood··not the other fellow's··YOURS!

THE LOUIS ALLIS CO., MILWAUKEE, WIS.



Making Good Machinery Better!

For over 40 years we have been developing special motors for special jobs — working with the designing engineers of many of the nation's leading machinery manufacturers — helping make good machinery better.

No matter what your electric motor problem or requirement may be, we invite your inquiry — and assure you that your needs will receive our prompt and careful attention in every way.

The motor illustrated is our TOTALLY ENCLOSED FAN COOLED Dust Proof motor — which is available in a wide range of electrical and mechanical modifications.

THE LOUIS ALLIS CO., MILWAUKEE, WISCONSIN

1893 **50th** 1943

ANNIVERSARY

On reaching a fiftieth anniversary, whether it marks an individual's life, the length of a marriage, or the span of a corporation's existence, it seems appropriate to hesitate for a moment to reflect on past memories as well as prospects for the future.

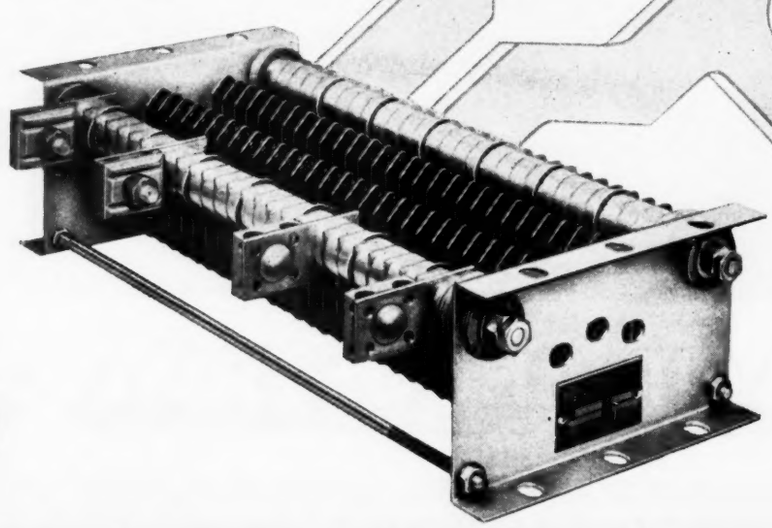
The Post-Glover Electric Company is fortunate to have lived thru fifty years which have brought electrical industry from infancy to maturity. As successor to a previous partnership, corporate life began May 3rd, 1893. Since that date, first as a distributor, and later as a manufacturer, a diversity of electrical equipment and supplies has been furnished to industry.

More than twenty-five years ago, Post-Glover introduced the steel grid resistor, a forerunner of the "non-breakable" steel grid resistor now favored for heavy duty applications, particularly for production of metals, minerals, and for transportation service.

With the development and improvement of P-G Steel Grid Resistors, other activities have gradually been curtailed with practically all production now confined to resistors. This concentration of purpose and evolution to one main product is largely responsible for the reputation for dependability and prompt service of which The Post-Glover Electric Company is rightfully proud.

Today, prompt service is becoming more difficult to maintain but dependability of product remains constant as always. For the future, whatever that may hold, Post-Glover gives its pledge to continue the high standards of the past, and to provide the best service that war conditions will permit.

It has been a real pleasure — and of course profitable to serve you. Thanks Industry for your confidence, we shall try always to be worthy of it.

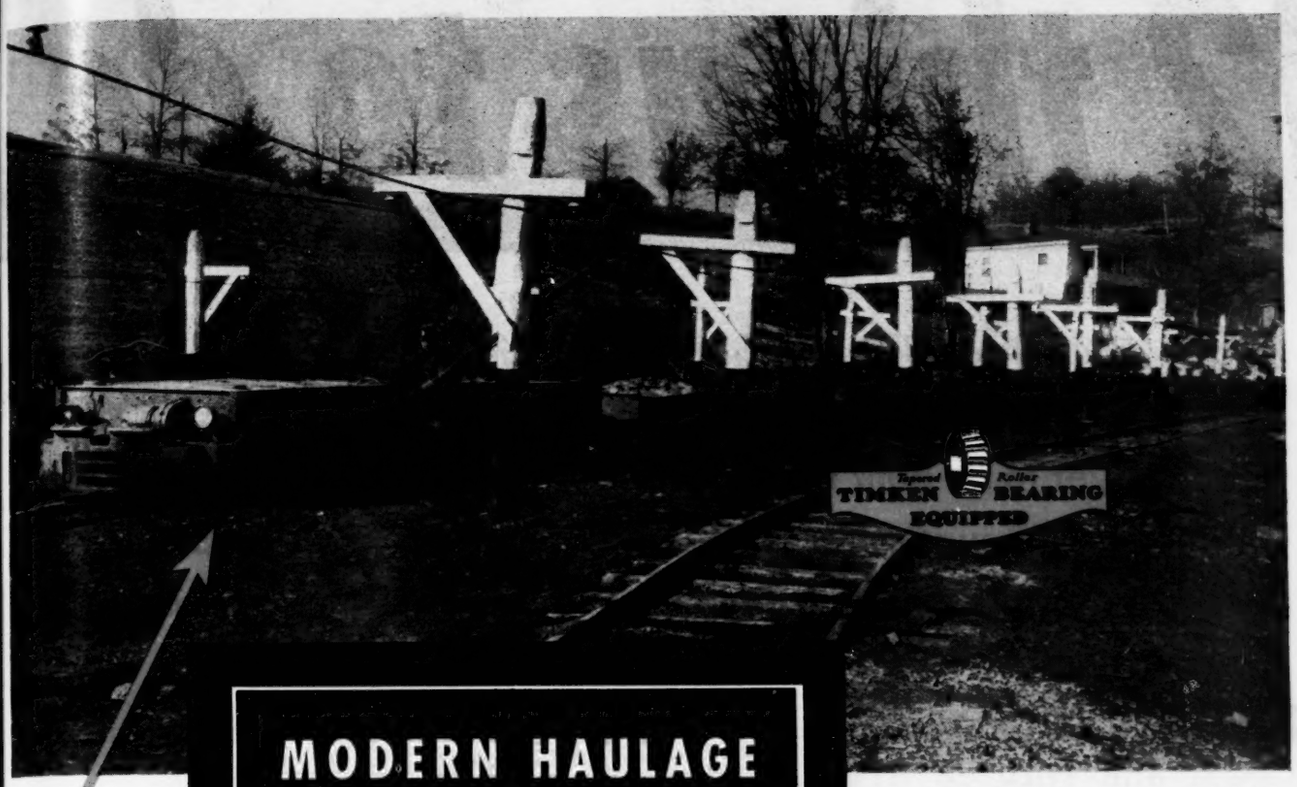


P-G

THE POST-GLOVER ELECTRIC COMPANY

• ESTABLISHED 1892 •

221 WEST THIRD STREET, CINCINNATI, OHIO



MODERN HAULAGE AT THE GULF MINING COMPANY

Trip of Watt Mine Cars equipped with Timken Bearings at the Gulf Mining Co., Crab Orchard, W. Va.

The Gulf Mining Company, Crab Orchard, W. Va., producers of the well-known Sewell Smokeless Coal, operates 180 modern four axle, all-steel mine cars equipped with Timken Tapered Roller Bearings as an important part of its production set-up to meet the increased demands of the war program. These cars were manufactured by Watt Car & Wheel Company, Barnesville, Ohio, the first cars going into service in 1934.

Modern Timken Bearing Equipped mine cars speed up mine transportation because more loaded cars can be hauled per trip; lubrication periods are fewer and farther between; cars spend more time on the job —less in the repair shop.

Timken Bearings are wheel savers, too, because they assure maintenance of correct wheel gauge and afford full protection against radial, thrust and combined loads. The Timken Roller Bearing Company, Canton, Ohio.

To Mine Equipment Builders: Don't wait to see what will happen after the war. Redesign your equipment to use more Timken Bearings. Then you'll be ready for anything.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

"ALL THERE IS IN BEARINGS"

12 things to do

A coal cutter that lasts longer defers the drain on precious materials needed badly in some tank or ship or gun yet to be built for some battle yet to be won. These maintenance suggestions if followed religiously will help to keep your coal cutters cutting and your production at peak.

START a regular lubrication program and stick to it!

1. Appoint men to job of inspecting and lubricating all machines.
2. Follow instructions shown on lubrication plates.
3. Use the detailed lubrication chart that is furnished with each machine.
4. Keep the program simplified. If it is too intricate, it will not be carried out properly.

CHECK the cutter bar and cutter bits.

1. Study the face of the kerf—that's where most troubles originate.
2. Be sure the kerf is smooth—a ridged kerf increases power consumption.
3. See that clearance between cutter bar and outside bits is at least $\frac{7}{8}$".
4. Bits should be set out to $1\frac{3}{4}$".
5. Dull cutter bits are expensive to operate and do not produce as much as sharp bits will.

DON'T sump a shortwall in fast feed.

1. Average load in making a sumping cut in fast feed is 5 times greater than the average cutting load.
2. For safety, remember that handling speed is 15 times as fast as the cutting feed.

USE proper size feed ropes—give them regular care and lubrication.

1. The feed rope serves as a margin of safety—rope trouble means excessive wear at some other point in the machine.
2. If rope breaks, check the cutter bar clearance and also check the condition of the cutter bits.

MAKE cable splices tight and safe.

1. Using temporary splices should be an emergency practice only.
2. Poor splices can cause blowups, breakdowns and loss of power.
3. Have all temporary splices properly soldered and jackets repaired as soon as possible.

to keep your Coal Cutters Cutting

INSPECT... Make an "all-out" inspection of your machines at regular intervals.

1. Clean and check all bearings, gears and pinions.
2. Check all shafts for misalignment.

KEEP your machines clean.

1. Clean machines will operate more smoothly, do more work and will cost less to run.
2. Dirt, dust and oil around a machine are a hazard to safety and hinder efficient performance.

CHECK the cutter chain lacing on your machines.

1. Proper lacing will keep power costs down.
2. Select the cutter chain lacing that will serve best on your machine. A lacing suitable for a slow speed shortwall will not work well on a modern, track-type cutting machine.

HAVE a uniform policy for replacing worn parts.

1. When ordering repair parts, give manufacturer *all* the information you can.
2. Part number, part name and shop number of the machine are necessary.
3. Complete information will enable the manufacturer to supply you quickly and satisfactorily.

CHECK electrical motors and controls regularly.

1. Coal cutters operate under conditions that place strain on electric equipment.
2. Dirt and dust filter into the motor, cutting down its efficiency.
3. Check the oil seals frequently and blow out dirt by using compressed air whenever possible.
4. Armature should be removed once each year and thoroughly cleaned.
5. Keep commutator clean to eliminate excessive brush wear.

KEEP Automatic-type electrical controls clean.

1. Inspect regularly, checking all springs.
2. Never use emery on contact points, clean with file or sandpaper.
3. Check all terminal nuts and bolts. This is a simple precaution that will save time and trouble.

REMEMBER Coal makes the heat that produces the weapons that arm the Americans who are fighting our enemy.

Uncle Sam needs all the coal you can produce ...and all the metal you can get along without. Produce the one . . . save the other. This is *your* job in this war.

SULLIVAN MACHINERY COMPANY, MICHIGAN CITY, INDIANA

Canadian Sullivan Machinery Co., Ltd., Dundas, Ont.

SALES OFFICES

Birmingham, Ala.
Butte, Mont.
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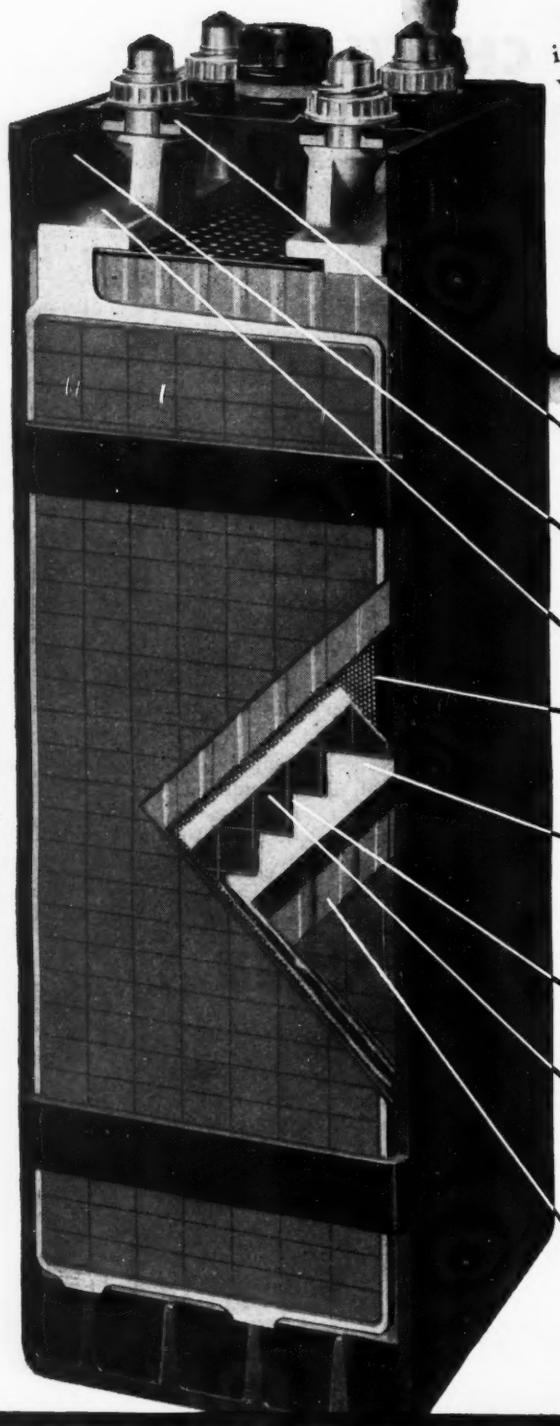
PRODUCTS

COAL MINING MACHINES • SCRAPER HAULERS • ROCK LOADERS • HOISTS • CAR PULLERS • AIR COMPRESSORS COAL DRILLS • ROCK DRILLS • CUTTER BIT SHARPENERS and HEATERS • CORE DRILLS and CORE DRILL CONTRACTING

Inside story of GOULD KATHANODE

What comes out of a battery depends on what goes in. Here you can see why Goulds do the job better, why they're guaranteed to equal or exceed in capacity any battery of comparable size and cell structure and, finally, why Gould Kathanode is your best choice for railroad car lighting and air conditioning, for mining locomotives and shuttle cars, for industrial trucks . . . Free help on battery problems—write Gould Storage Battery Corporation, Depew, N. Y.



LEAK-PROOF SEAL provided with a soft rubber gasket between the underside of the cover and the flange of the terminal post.

AMPLE SEALING SPACE is found in the exceptionally deep recess for sealing the hard rubber reinforced cover to the jar walls.

AMPLE CROSS SECTION of terminal posts and cross bars allow full current carrying capacity.

FULL POROSITY for retainer mats provided by perforated hard rubber envelope, open at top and bottom. Vertical edges are unperforated to give extra rigidity and insure insulation.

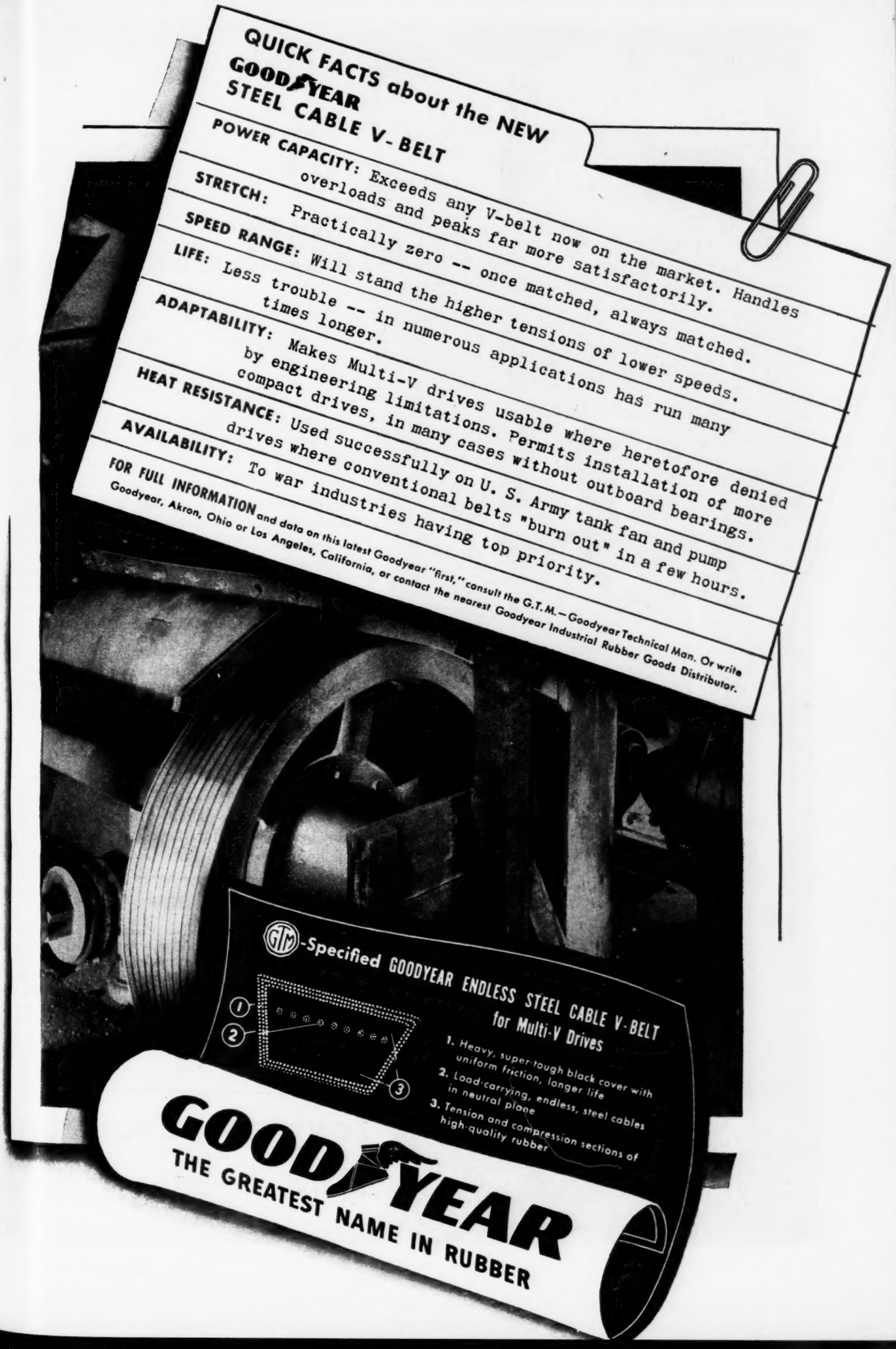
SPUN GLASS RETAINER MATS, impervious to electrolytic action, hold active material in place in positive plate grids. Fine enough to prevent the small particles of active material from falling out, they have a porosity of over 90%, permitting free access of electrolyte.

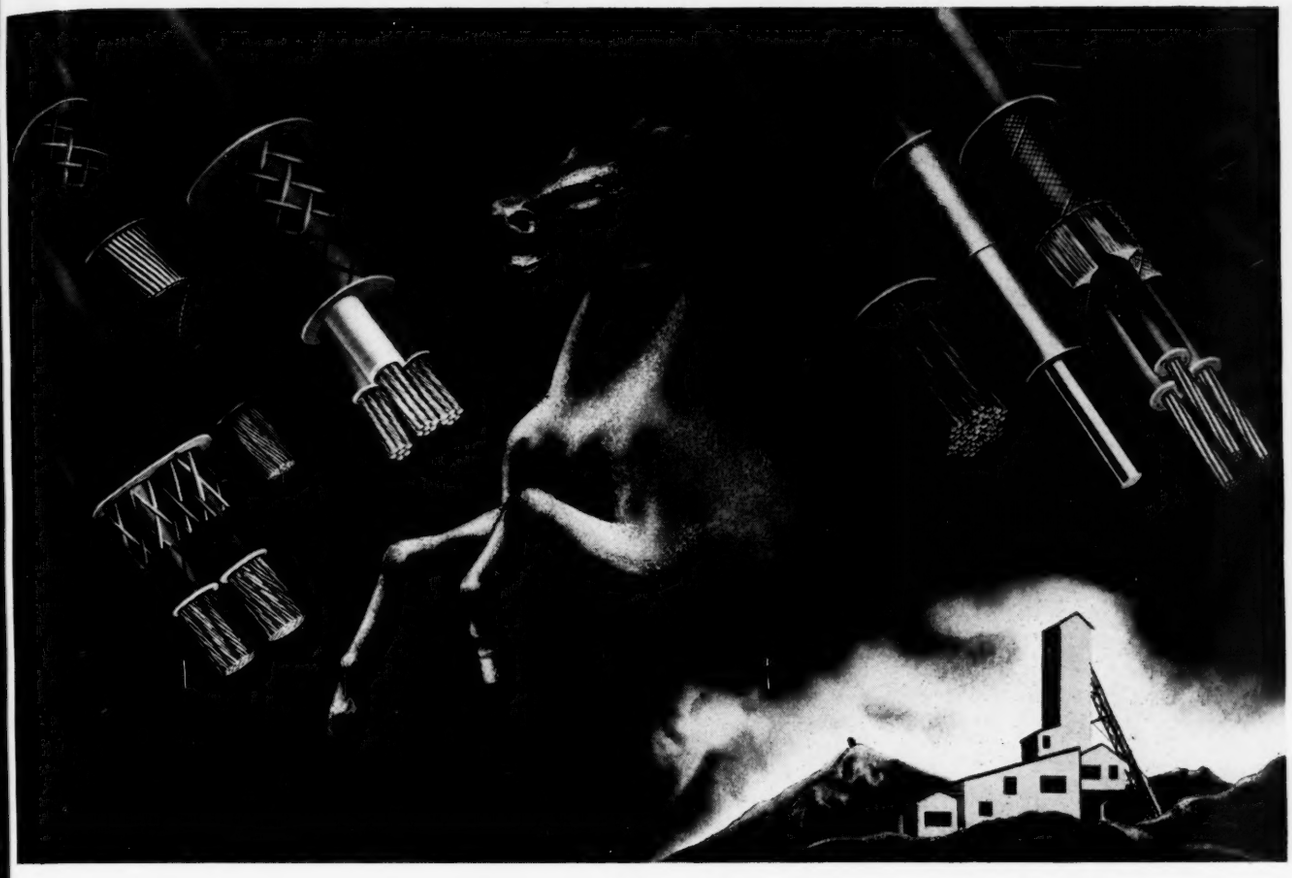
REINFORCED POSITIVE BASE structure is so strong that it will withstand every kind of service abuse without failure, throughout the entire life of the cell.

NEW TYPE OF ACTIVE MATERIAL—"Ananide", developed by Gould has high metallic content. Finely divided lead is available for the semi-plante action of the cell to convert into new active material to replace the small amount lost by sedimentation.

LONG LIFE SEPARATORS of high heat resistant materials complete the cell assembly (positive plate, spun glass mats, envelope armor).

GOULD THE BATTERY PICKED BY ENGINEERS


QUICK FACTS about the NEW GOODYEAR STEEL CABLE V-BELT
POWER CAPACITY: Exceeds any V-belt now on the market. Handles overloads and peaks far more satisfactorily.
STRETCH: Practically zero -- once matched, always matched.
SPEED RANGE: Will stand the higher tensions of lower speeds.
LIFE: Less trouble -- in numerous applications has run many times longer.
ADAPTABILITY: Makes Multi-V drives usable where heretofore denied by engineering limitations. Permits installation of more compact drives, in many cases without outboard bearings.
HEAT RESISTANCE: Used successfully on U. S. Army tank fan and pump drives where conventional belts "burn out" in a few hours.
AVAILABILITY: To war industries having top priority.
FOR FULL INFORMATION and data on this latest Goodyear "first," consult the G.T.M.—Goodyear Technical Man. Or write Goodyear, Akron, Ohio or Los Angeles, California, or contact the nearest Goodyear Industrial Rubber Goods Distributor.
GTM-Specified GOODYEAR ENDLESS STEEL CABLE V-BELT for Multi-V Drives
1
2
3
1. Heavy, super-tough black cover with uniform friction, longer life
2. Load-carrying, endless, steel cables in neutral plane
3. Tension and compression sections of high-quality rubber
GOODYEAR
THE GREATEST NAME IN RUBBER



HORSEPOWER–NOT MANPOWER

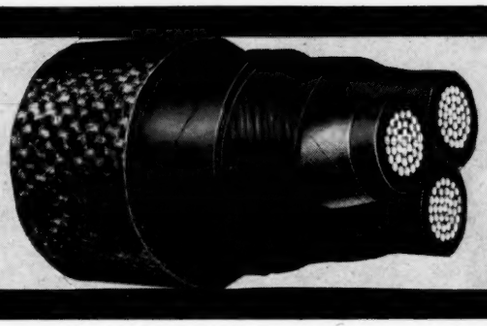
–will increase production!

With coal mine manpower steadily declining, the only practical solution to the problem of increasing production is to use greater electrical horsepower! It is the only solution to the problem of producing *more* coal with *fewer* men.

And in increasing electrical horsepower, be sure that it travels steadily and uninterruptedly – through HAZARD "tested" electrical wires and cables – the wires and cables that assure an uninterrupted supply of power for all electrical mining operations.

HAZARD Electrical Wires and Cables are designed for coal mining service and stand up where there is not only the acid moisture to contend with but also explosive gases, the possibility of roof-falls or other disturbances; where heavy cables must be suspended in shafts and boreholes; where portable cables are dragged over rough and jagged surfaces and are subjected to the hardest sort of treatment.

To secure mining cables that result in continuity and safety of operation with high efficiency and economy, consult our catalog of "Electrical Cables for Mining Use". If you do not have a copy we will be glad to send one free upon receipt of request.



Eliminating the need of a lead sheath, the tough jacket of Hazard Mine Power Cables is moisture resisting, long lasting and unaffected by mine acids.

3296

HAZARD

Electrical Cables for Every Mining Use

HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE COMPANY

Works: Wilkes-Barre, Pennsylvania • Offices in Principal Cities

FIG. 1 — In theory, the only possible contact between a circular axle and a larger circular wheel-bore is a line. Actually, in a mine car wheel the lubricant may widen this theoretical line bearing to a bearing surface possibly ½" wide. If the hub is 6" long, this means that the entire load on this wheel must be carried on a bearing surface of not over 3 square inches. Realizing the wear thus imposed by loads of one or two tons at this point on all plain and self-oiling wheels, A.C.F. has long made all such wheels of the particular mixture of metals best suited to meet the conditions under which these wheels operate.

AMERICAN CAR

...EAR OUT...IN THE HUB?

When loads and/or speeds increase above a certain point, all plain and self-oiling wheels will wear out in the hub, no matter how well they are lubricated. For the reason why, look at Fig. 1.

You can end hub wear, and greatly increase speeds and loads, by using on your mine cars a type of bearing long used on freight cars. Fig. 2 shows the advantages of this bearing.

Modern Q.C.F. trucks with wheels of the type shown at right mounted on anti-friction bearings will meet the speed-up the war demands — and will give you efficient equipment for years of later use at a great over-all saving.

A few new parts can often work wonders. We can supply needed new wheels, trucks, axles, bumpers, and electrically welded end sill construction with spring bumpers. Delivery of complete cars depends upon receipt of materials.

Our entire organization and manufacturing facilities are at your service to aid you to mine your share of the more than 600,000,000 tons of coal that will be needed in 1943!

Q.C.F. mine car wheels of the type shown at the right, mounted on modern anti-friction bearings, take the wear entirely out of the wheel hub. By substituting rolling for sliding friction, they reduce the power needed to operate the cars to a minimum. They will give long years of service of the highest type at lowest cost, and will pay for themselves many times over.

Q.C.F. Chilled Tread Mine Car Wheels, as manufactured under our heat-treating process, are made from a special mixture of metals—better for mine car wheels than steel or iron, alone.

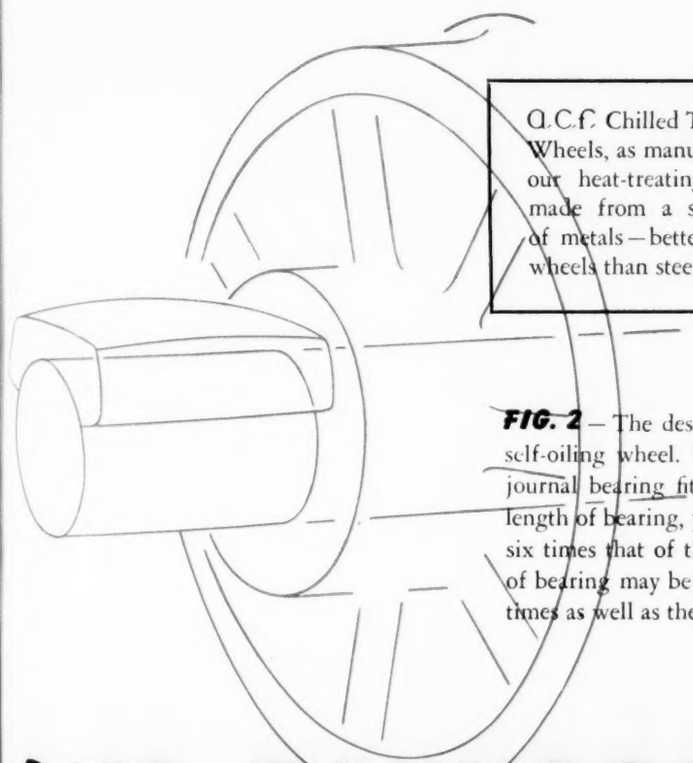
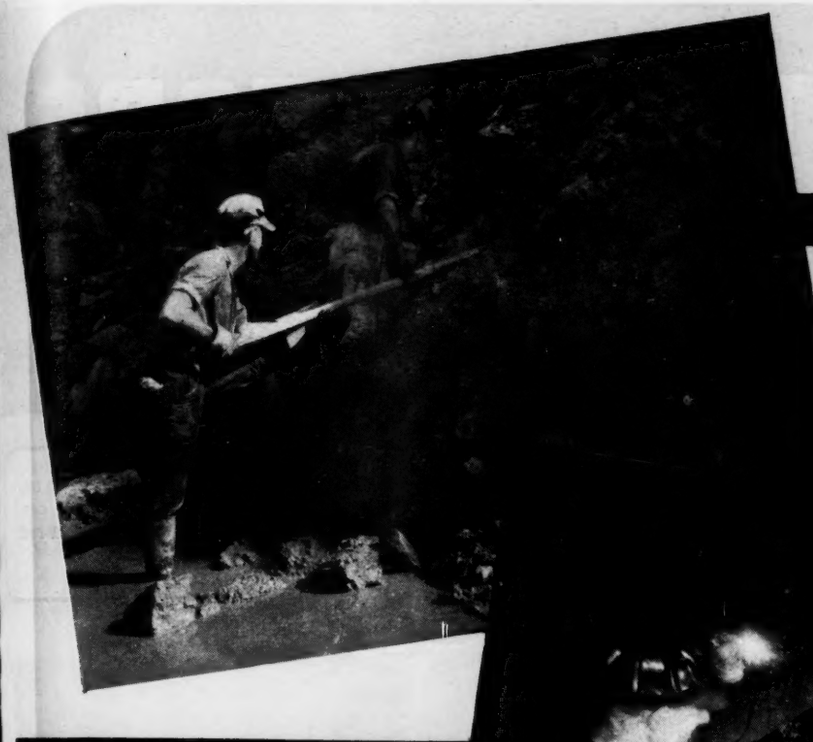


FIG. 2 — The design here shown offers many advantages over the plain or self-oiling wheel. It takes the friction entirely out of the wheel hub. The journal bearing fits around the axle for about 3". Assuming the same 6" length of bearing, you here get a bearing surface of about 18 square inches — six times that of the plain bearing. This means that this "freight car" type of bearing may be counted on to take care of the load and speed at least six times as well as the plain or self-oiling wheel.

...R AND FOUNDRY COMPANY

New York • St. Louis • Chicago • Philadelphia • Berwick, Pa. • Pittsburgh • Cleveland • Huntington, W. Va.



POWDER NATIONAL COMPANY

"Not living on our reputation but building it"

NATIONAL POWDERS

New and Revolutionary

National Slim-Ite Powder Series (1, 2, 3) for the shooting of overburden in Strip Mines are new and revolutionary. Whether the holes are wet or dry, shallow or deep, rock, clay or shale, or a mixture thereof, they will do your work with the least loss in shovel hours, and the greatest recovery per pound of powder.

From the Ten National Permissible Powders, all of which are new formulae, you will find one National Permissible that will prepare your coal at the face a little better than you have ever prepared it.

Whether you are Deep Mining Anthracite or Bituminous, or whether you are Strip Mining Anthracite or Bituminous, National Powders offer you something that you cannot afford to dismiss without investigation.

NATIONAL POWDER COMPANY

ELDRED (McKean County) PENNA.

Manufacturers of High Explosives for All Industrial Purposes

Bethlehem Announces:

THE LAY-LOCK CLAMP for mine-shaft hoists

As all mine operators know, the danger spot in any mine-hoist rope is the point where the rope is socketed or clipped to the cage. Stresses concentrate here and fatigue is apt to be severe.

To protect the men who ride in the car, it has long been an established practice in a good many mines to fasten a safety clamp to the hoist rope above the cage.

This clamp is then connected to the cage by means of heavy chains, and is intended to support the car in the event of failure at the socket. Naturally, it is extremely important that in case the socket gives way the clamp shall not slip.

Bethlehem's new Lay-Lock Clamp is a definite improvement over non-locking clamps formerly used.

The Lay-Lock Clamp has a positive locking grip. Its two halves contain molded zinc inserts which grip the rope tightly in every nook and cranny. When the clamp is bolted in place, the rope is embedded in solid zinc. It cannot slip.

For full details about obtaining Lay-Lock Clamps for your mine, get in touch with the nearest Bethlehem district office.

Here's how a Lay-Lock Clamp is installed

(TOP PICTURE)

Workmen are fitting the hoist rope into a molded zinc insert. The lay of the rope is molded in the zinc of the two inserts, providing an "all-over" gripping surface.

(MIDDLE PICTURE)

The two halves of the Lay-Lock Clamp are now being bolted together. Inside the clamp, the zinc inserts lock the lay of the rope in a non-slip grip.

(BOTTOM PICTURE)

Here the men are attaching the safety chains in place on the ears of the Lay-Lock Clamp. The mine hoist is now nearly ready to go into normal operation.

BETHLEHEM STEEL

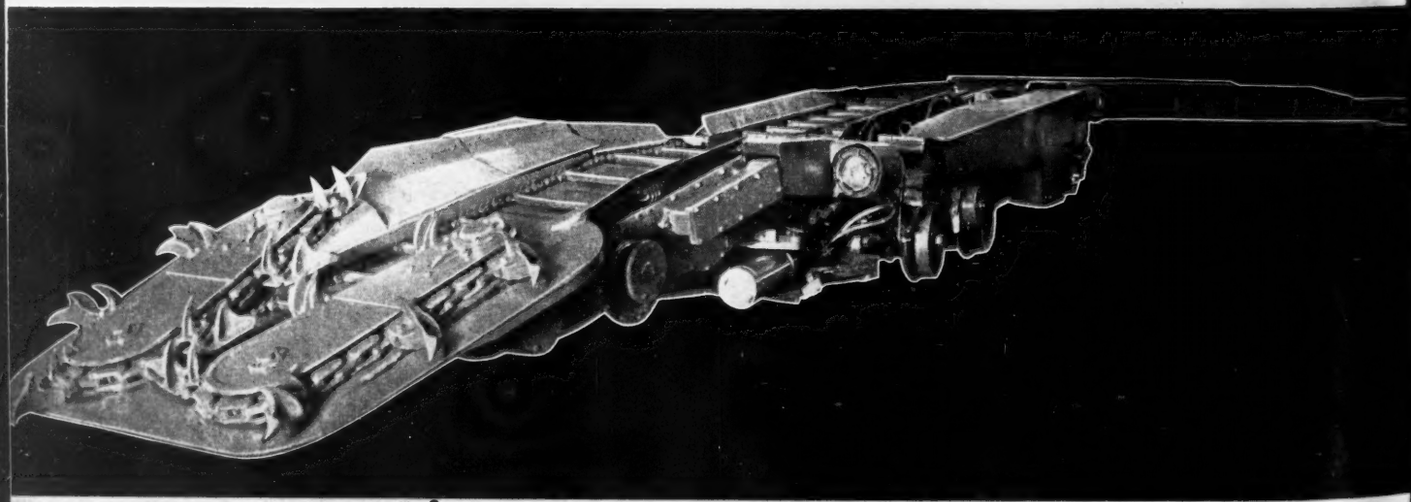
wide APPLICATION RANGE...

CLARKSON Universal LOADER 24 BB TRACK MOUNTED

--- Ability of this LOADER to dig in very low as well as high seams of coal---its adjustability to loading low or high mine cars means faster production. Digs out tight corner shots perfectly —operated from one central point — vertical or horizontal adjustment — flexibility to meet your requirements. This LOADER will give you greater tonnages at less operating cost.

• Built for 38-inch coal and over —has a fast loading and tramming speed. The highest point of conveyor is only 23 inches from rail.

LOWEST LOADING MACHINE ON WHEELS



PATENTED

The CLARKSON MANUFACTURING COMPANY

NASHVILLE ILLINOIS

ROBINS
CONVEYING BELT COMPANY

changes its name!

For nearly half a century, we've borne this fine old name . . . borne it proudly . . . made it the synonym and symbol of quality not only here but in many other parts of the world. Now we lay it aside tenderly . . . not entombed but enshrined.

In its place, we adopt a new name . . . a name more truly definitive of the range of our products, the extent of our services . . . services to those who mine coal, ore, minerals, sand, gravel . . . services to those who use these elements to manufacture the implements of industry which make this country great and strong and victorious. To these people, these corporations, ROBINS has long been known and honored for its pioneering spirit . . . its daring to try the seemingly impossible in order to advance the industrial economy of the nation and the world.

During the first decade of its existence, ROBINS conceived and introduced 41 innovations in the field of materials handling methods and machinery.

In the years since then, other equally radical and constructive advancements have been initiated by ROBINS. Because they are so wide in variety, in utility and in application, we believe it advisable to adopt a name more encompassing, a name less restrictive in its connotations than Robins Conveying Belt Co.

And now — without any change in directorship, management or corporate structure, we become: ROBINS CONVEYORS INCORPORATED.

FOR MATERIAL AID
IN MATERIALS HANDLING . . . . ***It's ROBINS***

ROBINS created

THE FIRST belt made especially for conveying materials
THE FIRST troughed belt conveyor
THE FIRST belt with a thick cover at the center
THE FIRST splice made with a portable vulcanizer
THE FIRST single-plane idler
THE FIRST stepped-ply belt
THE FIRST protected screw takeup
THE FIRST self-reversing tripper
THE FIRST belt conveyor for handling stone
THE FIRST belt conveyor for carrying coal
THE FIRST belt conveyor for sand and gravel
THE FIRST conveyor storage system
THE FIRST picking belt
THE FIRST belt conveyor in a gas works
THE FIRST belt conveyor that ever handled copper ore
THE FIRST mechanical ore bedding system
THE FIRST belt system for loading colliers
THE FIRST conveyor for handling excavated material
THE FIRST system of belt conveyors to handle mixed concrete
THE FIRST tandem-driven belt conveyor
THE FIRST tripper with a side-discharge belt
THE FIRST conveyor belt 96 inches wide—the widest ever built
THE FIRST conveyor on a dredge
THE FIRST counter-weighted hoisting tower
THE FIRST "Ward Leonard System" hoisting tower
THE FIRST hydraulic hoisting tower
THE FIRST power-saving idler
THE FIRST belt-unloading system for boats
THE FIRST travelling bridge using a belt for stocking and a bucket for reclaiming
THE FIRST airplane-tripper
THE FIRST belt feeder
THE FIRST ship loading plant with tripper and loading boom
THE FIRST conveyor in a tunnel under a storage pile
THE FIRST rotary grizzly
THE FIRST rotary stone grizzly
THE FIRST training return idler
THE FIRST positive training troughing idler
THE FIRST circle-throw screen
THE FIRST single-shaft circle-throw screen
THE FIRST to use cider cloth on conveyor belting
THE FIRST self-feeding coke wharf

ENGINEERS • MANUFACTURERS • ERECTORS

ROBINS
CONVEYORS
INCORPORATED
(ROBINS CONVEYING BELT CO.)
PASSAIC • NEW JERSEY

MATERIALS HANDLING MACHINERY

It takes TIME-TESTED EQUIPMENT . . . to "DELIVER THE GOODS"

APRON CONVEYOR PARTS
chain links, steel apron flights

650,000,000 Tons of Coal Required For Our Victory Effort in 1943!

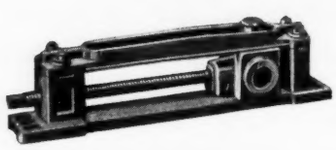
. . . that's a lot of coal, but Time-Tested Morrow Coal Handling Equipment is built with plenty of stamina in reserve to keep coal flowing for high *tonnage* emergencies. Check over your tipple and coal handling equipment today . . . and for repair and replacement parts call on Morrow!

MORROW,—with a background of 25 years of experience in designing, building and maintaining dependable tipple and coal handling equipment, can definitely help you to keep *your* equipment at peak operating efficiency!

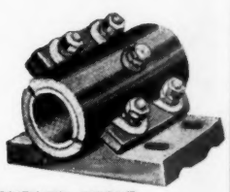
STANDARD SCREENING UNIT PARTS including rocker arms, pins, connecting rods, screen side bearings, screen hangers, etc.

GEARS

SPROCKET WHEELS



STANDARD TAKE-UP BEARINGS



STANDARD ANGLE BEARINGS

Complete Coal Tipples and Coal Handling Equipment

Shaking Screens
Coal Washers
Car Hauls, Picking Tables
Loading Booms, Loading Chutes
Bins, Bin Gates
Car Retarders
Settling Tank, Grizzlies

MORROW

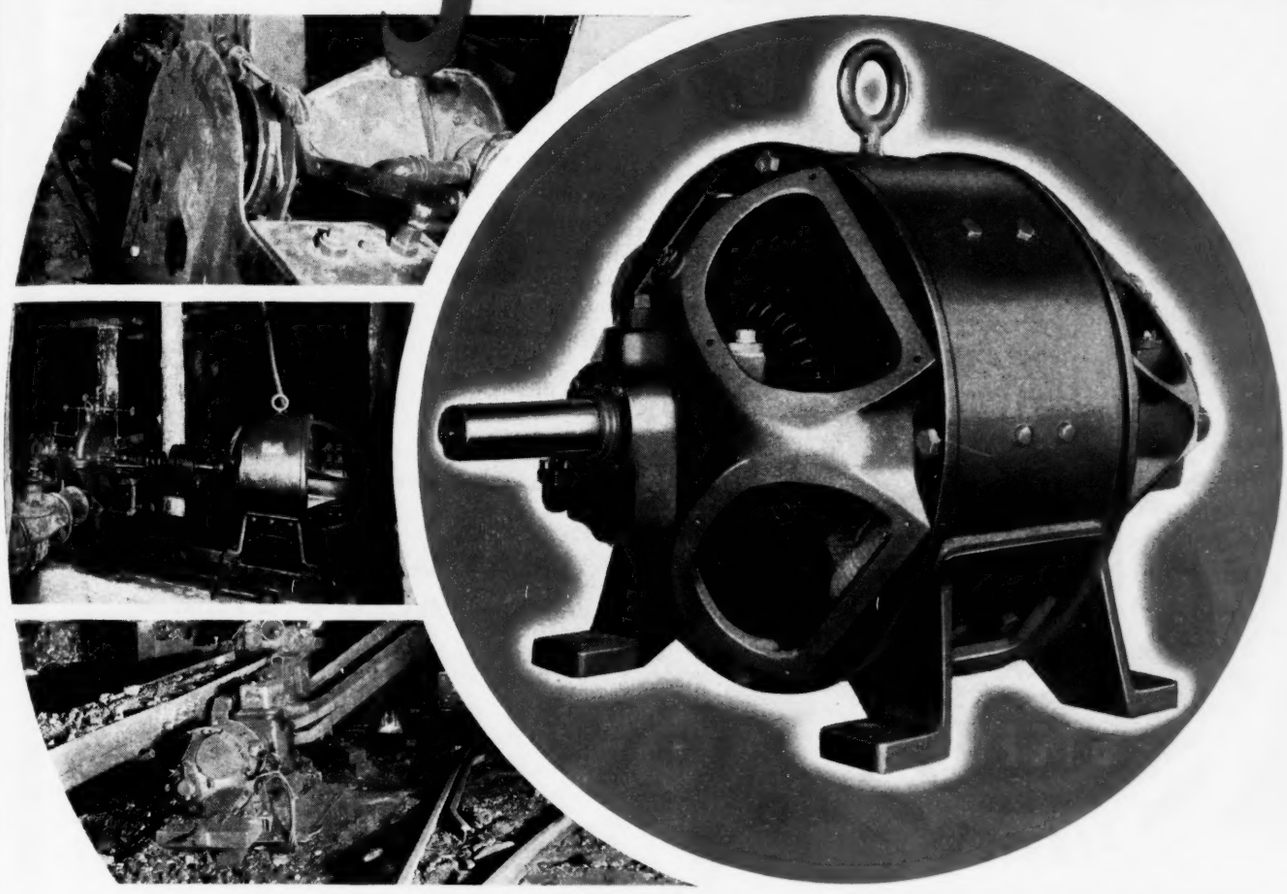
MANUFACTURING CO. · WELLSTON, OHIO

DESIGNERS AND BUILDERS OF COAL HANDLING EQUIPMENT FOR OVER 25 YEARS

Revolving Screens
Perforated Metal Screens
Flanged Lip Screen Plates
Elevating and Conveying Machinery
Sand and Gravel Screening and Washing Machinery

here's 3 shift stamina

FOR EVERY UNDERGROUND MINING OPERATION



Type SK Motors are Designed for Mining Conditions... Built for Mining Service

One important rating never found on the name plate of any motor is *stamina*. But stamina is one of the biggest reasons there are more Westinghouse SK Direct-current Motors working in mines than any other make.

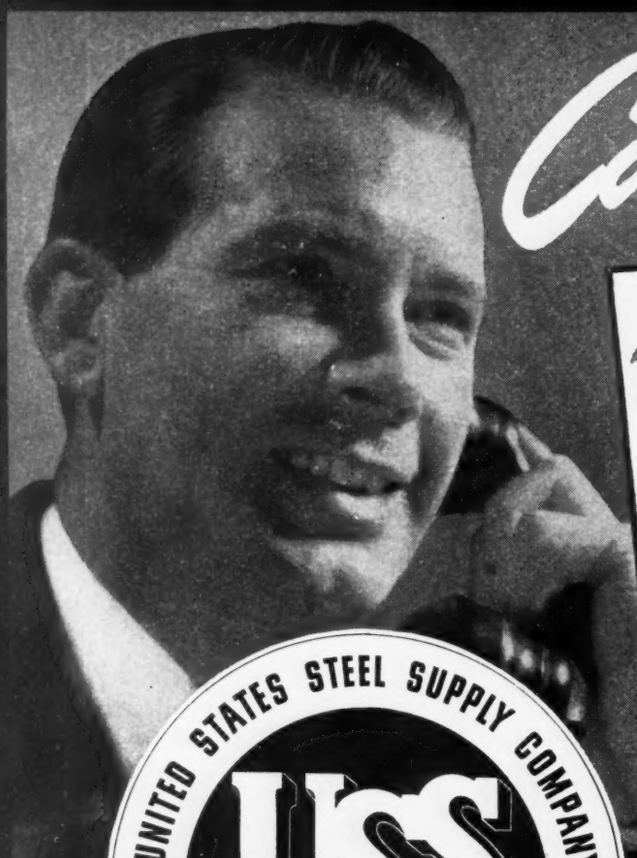
Three shifts a day, week after week, these motors stay at their work quietly doing the various jobs which have to be done in mines . . . pumping, cutting, hoisting and conveying . . . in spite of grit, dust and moisture.

Whenever these motors do need service, the feature of interchangeable parts speeds repairs and reduces outage time. Essential dimensions of today's SK Motors are the same as those of the first ones built in 1911. Armatures, armature coils, field coils, bearings and other parts, made for the 1942 models, although vastly improved, can be used in earlier models of the same rating. This simplifies the problem of stocking parts and reduces costly inventories. It also means that repairs can be made quickly . . . that no time is lost waiting for delayed deliveries.

Booklet DD-4004 describes the SK Motor in detail. Ask your local Westinghouse representative for a copy. Or, write direct to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

J-21212

Westinghouse SK Mining Motors



Call us

for GENERAL PURPOSE STEELS

Steel products, tools, machinery and equipment

Like yours, our first job is to speed war production. So, if your production on a war job is in danger of being slowed down for want of some piece of steel—call our nearest warehouse. Many such calls have kept wheels turning.

Although our stocks are not what we wish they were, what we have can be yours—in a hurry—subject, of course, to priority restrictions.

If we don't have what you need, we'll do everything we can to help you find a source of supply. So try us—note our phone and teletype numbers below, at the left.

UNITED STATES STEEL SUPPLY COMPANY

USS STEELS

SERVICE

CHICAGO,	1319 Wabansia Ave., P. O. Box MM	BRUnswick 2000 *Teletype CG. 605*
BALTIMORE,	Bush & Wicomico Sts.,	GILmore 3100
BOSTON,	176 Lincoln St., Allston, P. O. Box 42	STAdium 9400 *Teletype BRTN. 10*
CLEVELAND,	1394 E. 39th St.,	HEnderson 5750 *Teletype CV. 153*
NEWARK, N.J.,	Foot of Bessemer St., P. O. Box 479	Bigelow 3-5920 REctor 2-6560 *Teletype NK. 74* BErgen 3-1614
PITTSBURGH,	1281 Reedsdale St., N.S.,	CEdar 7780 *Teletype PG. 475*
ST. LOUIS,	21st & Gratiot Sts.,	MAin 5235 *Teletype SL. 384*
TWIN CITY,	2545 University Ave. St. Paul, Minn.	NEstor 2821 *Teletype STP. 154*

UNITED STATES STEEL SUPPLY COMPANY

(formerly Scully Steel Products Company)

for NATIONAL EMERGENCY ALLOY STEELS

These new alloy steels were developed as substitutes for the old style alloy steels to save critical materials such as nickel and chromium. They cover a wide range of properties—were especially designed to meet present conditions. In fact, many "NE" steels are actually out-performing the steels previously used.

We welcome your inquiries and will gladly assist you in determining the grades best suited to your needs. Telephone, write or wire the warehouse nearest you.

for BERGSTROM *Free Flowing* HARD SURFACING ELECTRODES

If you operate any equipment on which some surfaces are subject to extra wear, you can save time and money by hard surfacing such areas. Scores of satisfied users have reported great success with Bergstrom Hard Surfacing Electrodes. Give maximum wear resistance. Easily applied in any position. AC or DC, with freedom from porosity. Six types—each designed to do a specific job.

WRITE FOR FREE INFORMATION

UNITED STATES STEEL

POUR

TYCOL

SCIENTIFICALLY

POINT*

* This is #3 of a series of informative messages concerning the meaning and significance of commonly used tests and terms employed to describe the characteristics of lubricating oils.

T I D E W A T E R L U B R I C A N I A

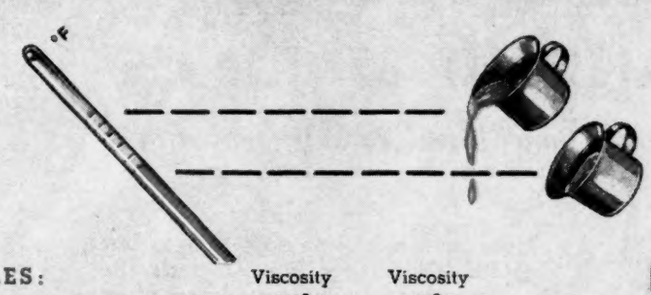
DEFINITION: The pour point is the lowest temperature at which the oil will pour or flow when chilled without disturbance under definite prescribed conditions.

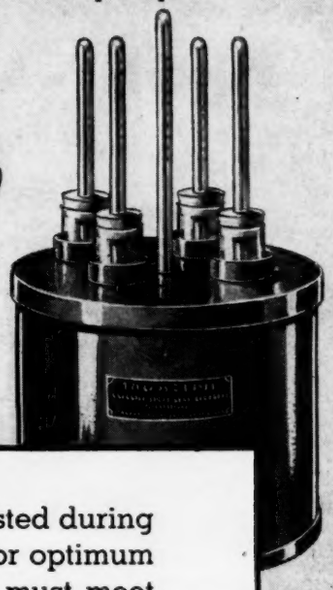
TEST: Following a carefully prescribed procedure with standardized equipment, the oil is chilled in a test jar or a corresponding 4 oz. sample bottle. At each oil temperature reading, taken at 5° F. intervals, the test jar is removed and tilted just enough to ascertain whether or not the oil is still fluid.

A temperature point will be reached at which the oil shows no movement when the test jar is held horizontally for exactly 5 seconds. The pour point is the temperature 5° F. above this "non-fluid" point.

SIGNIFICANCE: The pour point is an indication of the temperature below which it may not be possible to pour oil from its container, or below which it may not flow in gravity lubrication systems. This may be due either to partial separation of wax crystals forming a spongy network or to congealing of the oil itself.

Therefore the pour point bears no relation to the viscosity of the oil at higher temperatures. Neither does it indicate the pressure flow, or the tendency to "channel" at temperatures below the pour point.





EXAMPLES:	Viscosity at 210° F.	Viscosity at 32° F.	Pour
Paraffine Base Lubricant....	70	12,000	25° F.
Napthenic Base Lubricant..	70	50,000	0° F.

Tycol lubricants are rigidly controlled and tested during manufacture to the required characteristics for optimum performance. Among many other tests they must meet the pour point requirements of the individual application.

DRUMS! DRUMS! DRUMS!
War needs make it extremely important that all empty drums be returned immediately.

TIDE WATER ASSOCIATED OIL COMPANY

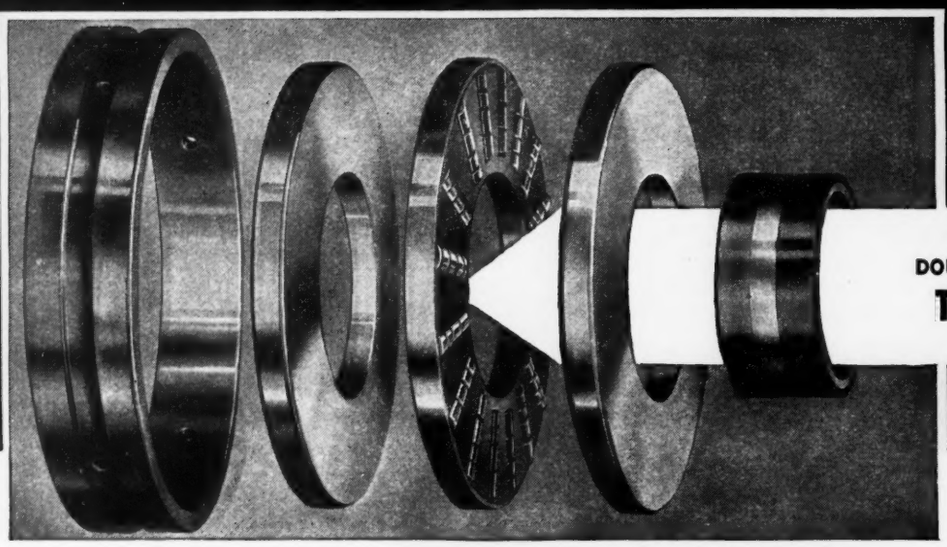
Eastern Division: 17 Battery Place, New York
Principal Branch Offices: Boston, Philadelphia, Pittsburgh, Charlotte, N. C.
MAKERS OF THE FAMOUS VEEDOL MOTOR OIL

OIL IS AMMUNITION
USE IT WISELY !

INDUSTRIAL LUBRICANTS

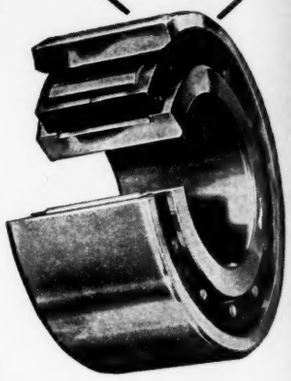
ENGINEERED FOR EVERY INDUSTRIAL USE

When Every Machine Must Do 3 Machines' Work!



*Type SDT
DOUBLE ACTING
THRUST

*Type MCS
DOUBLE
WIDTH
RADIAL



These simpler ROLLWAY
RIGHT-ANGLED BEARINGS

hold "down time" losses to a minimum . . .

For longer bearing life, more efficient performance and more economical maintenance . . .

FOLLOW THIS BASIC BEARING PRINCIPLE

- All radial loads carried at right angles to the roller axis.
- All thrust loads carried at right angles to the roller axis.

Not one shift, not two shifts, but THREE SHIFTS A DAY! That's the three-machine load your equipment must handle today. No wonder bearing wear increases. No wonder old-time service factors fail to predict bearing life. But even with this tripled operating time, there's a way to carry bearing loads that will make your bearings stand up longer. Here's the fundamental principle to follow:

Right-Angled Bearings Simplify the Load

Because they carry every load at right angles to the roller axis, Rollway Right-Angle Bearings split the load into its two simple components of *pure radial* and *pure thrust*. Only one of these loads is carried by a single bearing assembly. There are no oblique resultants, no compound pressures on the rollers. Magnitude of the stresses is considerably reduced. Life of the bearing is substantially increased. And machines can be run under heavier loads for longer periods.

Standard Sizes For Most Applications

S.A.E. or American Standard metric dimensions and tolerances are available for most applications . . . in a wide range of sizes and types that are "engineered to the job." Let Rollway's specialized bearing experience help you. Send your design or change-over specifications for free, confidential bearing analysis and recommendation. No obligation.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, NEW YORK

BUILDING HEAVY-DUTY BEARINGS SINCE 1908 **BEARINGS**

to KING COAL'S WAREHOUSE

COAL had reigned supreme as a fuel for six hundred years before meeting any noticeable competition from other combustibles. Oddly enough as this competition developed, research has shown the chemical possibilities of King Coal and today he is conquering a new world. The chemist has found in this black material a thousand compounds, and by skillful manipulation has made many of these primary raw materials in the manufacturing chemical industry.

From it come the brilliant dyes that take away some of the drabness of life — Pharmaceuticals that alleviate pain and eradicate disease — Textile fibres to clothe us — Explosives to protect our land and defeat our enemies. It will be the future source of our modern motor fuels. A myriad of yet unknown products from coal will issue from our chemical laboratories and find their place in our coming civilization. King Coal has a new world at his feet.

Industrial explosives are the keys to unlock these riches from King Coal's storehouse. The correct explosives, plus good blasting practice, are the important steps in the processes to synthesize all these materials. AMERICAN explosives fit well into this picture because they are the products of intensive chemical research, proper chemical control, unremitting and thorough inspection at every step in their manufacture. To consult in the selection of the proper explosive and its use, capable field engineers are available at your call.

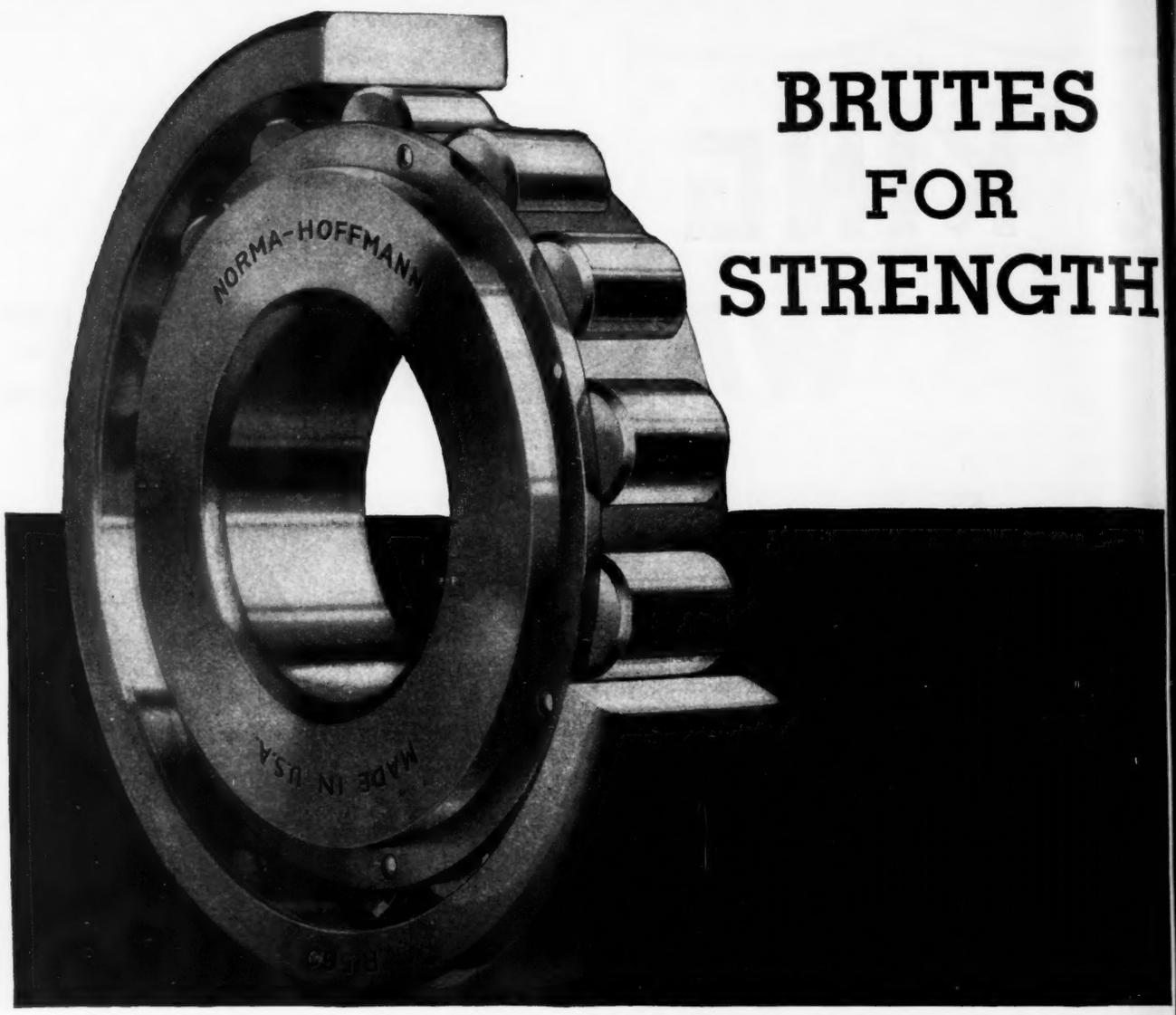
American Cyanamid & Chemical Corporation

A Unit of American Cyanamid Company

30 ROCKEFELLER PLAZA • NEW YORK, N. Y.

EXPLOSIVES DEPARTMENT

SALES OFFICES: Pittsburgh, Pa. Bluefield, West Va. Scranton, Pa. St. Louis, Mo. Chicago, Ill. Pottsville, Pa. Hazleton, Pa. Maynard, Mass.



BRUTES FOR STRENGTH

THE outstanding performance records made by NORMA-HOFFMANN PRECISION ROLLER BEARINGS under the heaviest and most exacting duties, are the logical result of the following distinctive factors:

Full line contact of rolling surfaces, affording a larger radial load capacity for continuous and intermittent service than any other type of single-row bearing, and providing a temporary overload capacity 50% above normal catalog rating, with greater resistance to shock and vibration.

Highly durable, completely machined and balanced bronze retainer riding on inner ring shoulders and minimizing internal load.

Lower frictional coefficient under heavy loads than any other single-row anti-friction bearing—due to extreme precision and design characteristics.

Test these PRECISION ROLLER BEARINGS in your own hardest service; remember that they have all the high speed qualities of the best ball bearings, and are interchangeable, size for size, with all single-row metric ball bearings.

Write for the catalog. Let our engineers work with you.

"NORMA-HOFFMANN"

PRECISION BALL, ROLLER and THRUST BEARINGS

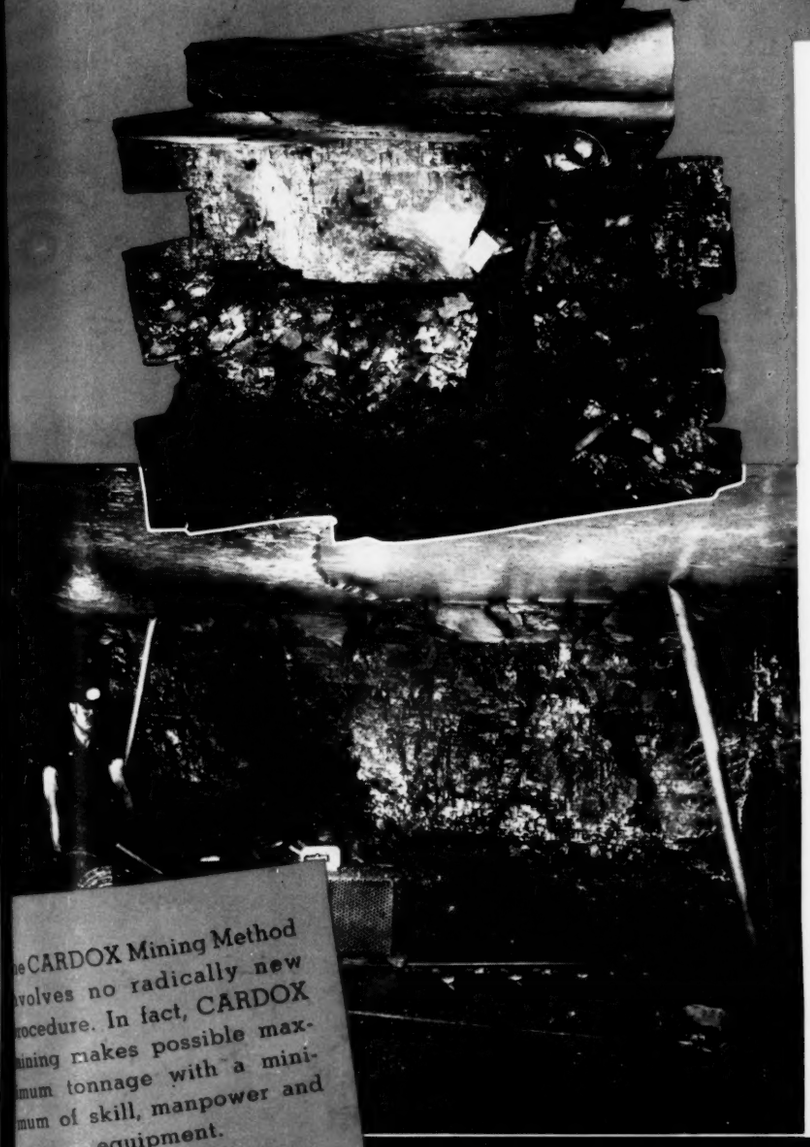
NORMA-HOFFMANN BEARINGS CORPN., STAMFORD, CONN. U.S.A.

TO WIN THE WAR: Work—Fight—Buy War Bonds

CARDOX

"THE NON-EXPLOSIVE MINING METHOD"

Gets MORE Tonnage



e CARDOX Mining Method
volves no radically new
rocedure. In fact, CARDOX
ining makes possible max-
mum tonnage with a mini-
mum of skill, manpower and
equipment.

WITH AVAILABLE MEN AND EQUIPMENT

● The value of CARDOX in making the most of available facilities extends over practically every phase of production.

Longer cutter bars can be used when the face is broken down with CARDOX. This provides more coal per face for the loading machine . . . reducing the time lost in moving the units.

Loading is faster . . . and the loading machine is subjected to less wear . . . because the slow heaving action of CARDOX rolls the coal forward in a loose pile.

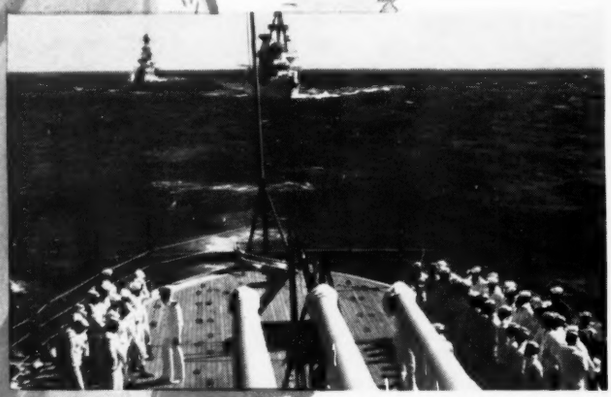
Men can work more efficiently . . . with less non-productive time per shift . . . because CARDOX produces no noxious fumes, and very little dust. Work can be resumed immediately after the face has been dislodged.

CARDOX also reduces many mining hazards. Its slow heaving action is less likely to cause roof failures. It squares up both face and rib so that the dangers resulting from overhanging brows in high seams are cut to a minimum. Impacts, friction, sparks or even flames have no effect upon CARDOX. When fire threatens, CARDOX Tubes become highly effective emergency fire extinguishers.

Let us demonstrate the tonnage-boosting possibilities of CARDOX by a test in your own mine.

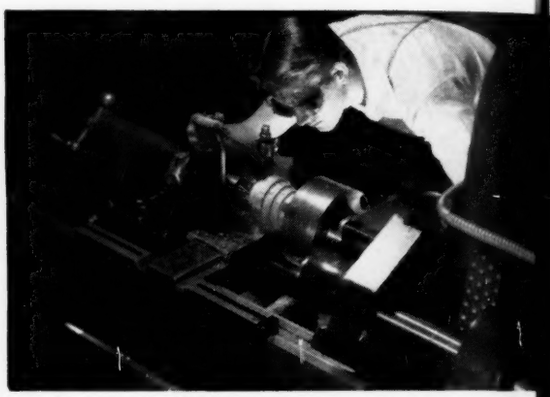
CARDOX CORPORATION Bell Building, Chicago, Illinois

The Battle for FREEDOM

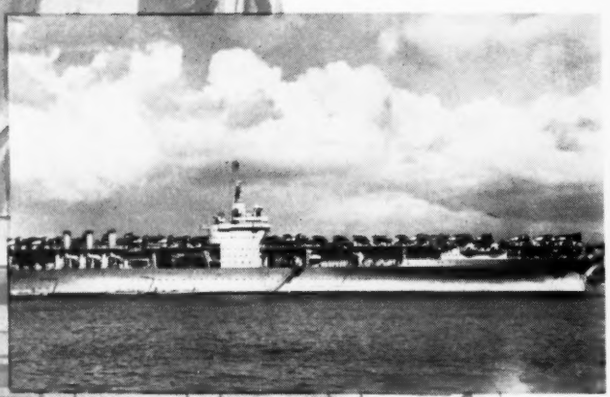


U.S. NAVY OFFICIAL PHOTO THROUGH UNDERWOOD & UNDERWOOD

The Navy on Parade is impressive.



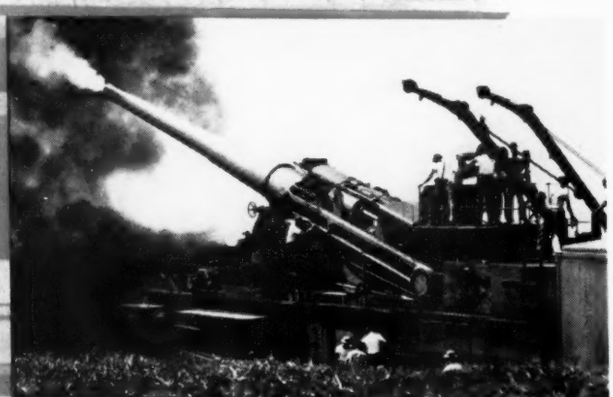
Soldiers of Production are vital too.



U. S. NAVY OFFICIAL PHOTO THROUGH UNDERWOOD & UNDERWOOD

Aircraft Carriers are the Navy's landing fields.

JOY Workmen are modern craftsmen—the workmanship in JOY Equipment is unsurpassed.



U. S. ARMY SIGNAL CORPS PHOTO THROUGH UNDERWOOD & UNDERWOOD

Power to strike hard and often is essential.

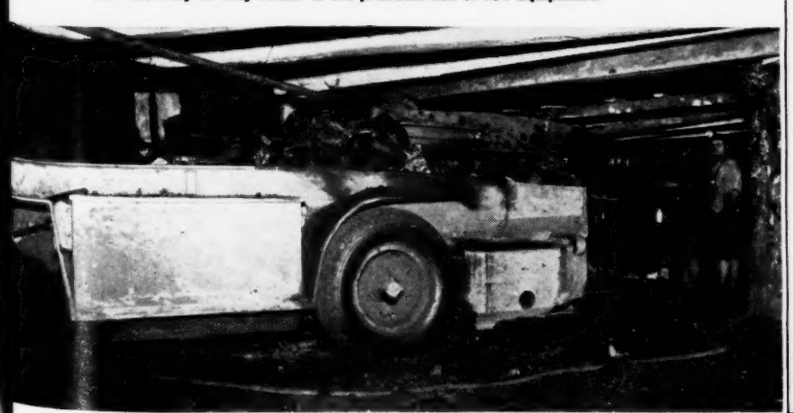
This war is not only being fought on lan and sea and in the air—but a great par of America's offensive action is takin place underground, as well.

Coal is essential to our war plants—a essential as ammunition is to our guns— and JOY takes particular pride in th part JOY Loaders, JOY Shuttle Cars an Conveyors are playing in speeding u production. For today, continuous con sistent output is vital.

SPECIFY JOY mechanized Loaders and Shuttle Cars

and The Battle for PRODUCTION

We will be glad to submit suggestions by JOY Engineers — men who know the problems of the Coal Industry as they relate to the practical use of JOY Equipment.



JOY Loaders and JOY Shuttle Cars are engineered and built to stand hard service with a minimum of maintenance.

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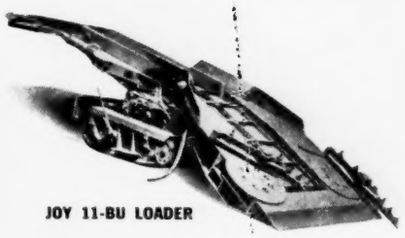

JOY 11-BU LOADER

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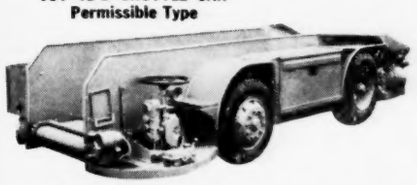
JOY 42-D SHUTTLE CAR
Permissible Type



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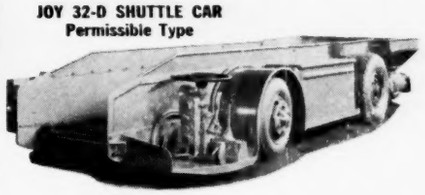


Call in a Joy engineer

JOY MANUFACTURING CO.
FRANKLIN, PA.

TRANSPORTATION—a vital war factor

The effectiveness of our armed forces and civilians alike depends on the efficiency of our transportation

As the battle of Tunisia entered its final phases, with the British and American forces joining hands to crowd Rommel into his last fox hole, Hitler and Mussolini held their twelfth war-time meeting.

One important purpose of this meeting, according to the Berlin radio, was the study of a specially prepared "Survey of Continental Reserves". Topping this list of resources is the item of transportation.

Hitler has a great many headaches these days but, according to no less an authority than the Reich Ministry of Economics, "the central problem of the whole German war effort is transportation". It is, in fact, the Achilles' heel of Germany's War Machine.

The Nazis have become soberly conscious of its crucial importance and Mr. Hitler must wince when he recalls the gigantic miscalculations which led him to neglect his railways.

He counted on a short war, not a long wear-and-tear war and Germany's transportation crisis is getting more critical by the hour. It will play a vital part in its defeat.

This is a war of movement—on land, on sea and in the air. Russia's 2,000 mile battleline, R.A.F.'s 700 mile bombing raids, General Montgomery's 1,500 mile advance last November and the vast area that constitutes the theatre of war in the Pacific make this fairly obvious.

Peace will come when one side gets control over the world's supply of fuel, oil and rubber, for on these three critical materials depend all the vehicles of war—as well as of peace.

An army used to travel on its stomach. Today it travels on its fuel tank.

On the home front, transportation is no less vital. Here it is essential in getting the war workers, their raw materials and their products, to and from the mines, mills and factories that supply our armed forces and those of our Allies. Transportation is a major factor in the nation's ability to out-produce its enemies. Every known method, every type of vehicle becomes essential, for no single group of carriers, freight or passenger, can meet all our needs.

The railroads opened the vast resources of our nation and continue to be the backbone of our transportation system. Today they are doing the greatest job in their history. They are hauling more tons of freight more miles than ever before—33% more than in 1941 and 55% more than in 1918, peak year of the first World War. They are carrying more passengers more miles than ever before—80% more than in 1941 and 24% more than in 1918. They are getting more work out of each car, each engine, and each mile of track than ever before. Private operation of railroads is proving far more effective and efficient in this war than did government operation in the last war.

This is the eleventh of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

In contrast to Hitler's Germany, the managers of the American railroads have not neglected their plant except where government priorities forced them to do so. They are turning in an unprecedented performance despite the long starvation period to which they were subjected. During the first World War the total investment in the American railroad plant was about $18,600,000,000. Since then $12,000,000,000 have been spent on improvements and after deductions for scrapped facilities the net increase has been $8,000,000,000. Since the present war in Europe began the railroads have invested about $1,650,000,000 in further improvements, many of them to meet special war needs.

Convincing evidence of the railroads' flexibility in meeting the special needs of all-out war is their performance in coping with the movement of oil to the East Coast. In January 1942, one month following Pearl Harbor, the railroads delivered to the East Coast by tank car less than 100,000 barrels daily. By December they had stepped this up to more than 740,000 barrels and during the week ended April 3, 1943 they

averaged more than 900,000 barrels per day. By the end of this year they are shooting for the goal of one million barrels a day.

Unlike Germany we have not attempted to control the development and growth of motor transportation according to the "intuitions" of one man but have wisely left it in the hands of experienced competition. That is how our highway transportation system came into being. Growing public acceptance has made it an essential part of our national economy.

The motor vehicle, its limitations set only by the improved highway and the supply of fuel and rubber, has developed to undreamed of proportions. Up to a year ago private automobiles consistently moved more people more miles than *all public carriers combined.* Buses have become an accepted means of mass transportation. Local electric and interurban railways in many cases were converted to bus lines and trucks took over the local freight services. Under these improved operating conditions traffic volume increased. When the war in the Pacific made it necessary for us to conserve our supply of rubber and the U-boat depredations in the Atlantic throttled the flow of gasoline to the eastern seaboard, our motor transport was forced to grapple with the toughest problem that ever had confronted it since it became so vital a factor in the every day transportation.

The "share-the-ride" idea recognizes the need of conserving gas, oil and rubber. This particularly applies to buses, for wherever groups can be assembled for a common destination, buses can be used most effectively. The intercity bus performs for the rural areas the same service that the local bus renders for the residential areas of our cities.

Reorganization of railroad schedules, adaptation of motor transport, rearrangement of working hours, all have contributed to provide a flexible transportation service for men and materials to meet the critical needs of the war effort. Twenty thousand intercity buses are handling 635 million passengers a year which is 69 per cent more than in 1941. The fact that these buses carry a relatively larger percentage of the total coach passenger business than their seating capacity would indicate suggests that here, too, we are getting a more efficient use of these vehicles in terms of passenger loads carried. It is fortunate to note that the geographic location of most intercity bus lines does not coincide with that of the railroads but rather supplements it.

The contribution which the urban transport industry is making to the war effort becomes apparent when we consider that buses, trolley buses and street cars today carry passengers at a rate which promises to exceed the impressive total of 21 billions, as compared with 18 billions in 1942 and an average of 13½ billions for the period 1936 to 1941. And this the industry is accomplishing with a minimum of added equipment and despite a serious drain on its manpower.

The truck lines, too, are setting all-time records. They have rearranged their schedules, eliminated circuitous routes and coordinated their services with those of other carriers. As this is written, contract truckers with the cooperation of the Office of Defense Transportation are trying to eliminate the empty return trip.

The transportation industry as a whole is face to face with the biggest job in its history. Increasing traffic loads, with little if any new equipment, difficulty in obtaining essential maintenance materials and a growing shortage of manpower, combine to make it that. While federal authorities, acting through the Office of Defense Transportation, took prompt cognizance of this condition, froze equipment and otherwise acted to conserve the vehicles then in service, it was not possible to add sufficient vehicles to keep pace with the increased traffic demand. However, the O.D.T. did lend impetus to the movement for staggering hours of work thereby spreading the peak loads and thus increasing the carrying power of existing fleets of vehicles in city service.

As we review the problems involved in meeting our transportation needs it is evident that we cannot depend upon new equipment alone for their solution. Lend-Lease is taking a considerable share of our much needed output of transportation equipment. The immediate job is up to the rank and file of the transportation industries. It is up to their resourcefulness and devotion to their job. The operating men out on the road, the men in the shops who keep the equipment going, who make the most of the metals and other materials they can have, who salvage, conserve and economize . . . these are the men who must bear the burden of our war load.

Theirs is a dramatic story, a story of cooperation and coordination . . . of ever increasing capacity on a shoestring allowance of new equipment.

For this is a war of movement. According to Joseph B. Eastman, Director of Defense Transportation, both the passenger and the freight traffic on the railroads is to a large extent war traffic – the transportation of troops and civilians on war business, the movement of food, raw materials and finished products required for the prosecution of the war. As Mr. Eastman put it, delayed arrival of troops at embarkation ports, delayed delivery of vital war materials could even conceivably mean the loss of men at the fighting front. And what Director Eastman says of the railroads applies to all forms of transportation. Transportation by bus, by street car, by truck, by train, by ship and by plane . . . all play a vital part in the achievement of victory . . . on the home front and on the fighting front which relies upon it.

President, McGraw-Hill Publishing Company, Inc.

COAL AGE

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

MAY 1943

ONLY THE BEGINNING

SECRETARY ICKES' analysis of "Coal's New Horizons" in last month's issue of *Coal Age* points up, as never before, the improved outlook of the coal-mining industry. But, and this should be emphasized, these new possibilities, these new outlets for tonnage, cannot be realized without much hard work in the fields of research, merchandising and consumer relations, to mention but a few.

To begin with, one question the industry must decide is whether it shall underwrite the costs of opening up these new markets or let some other agency or organization do it and reap the larger share of the benefits. It will be recalled that Secretary Ickes, while advocating government development of hydrogenation, left open the question of who eventually would commercialize the process. Consideration of this question leads inevitably to the next, which is: Shall the coal industry content itself with selling a raw material and a fuel or shall it go into processing and thus presumably secure the added returns flowing out of producing a new product?

Aside from the new outlets afforded by liquid fuels, including the colloidal type, rubber, plastics, chemicals and the like, there still remains, also, that old standby, the fuel and heating market. There still is plenty left to be done in that market alone—enough to warrant not only a major research effort but also a major sales promotion and consumer relations program, especially if coal expects to make happy those new customers it has and will inherit from oil and other competitive fuels.

Concerted action now seems more imperative than ever in view of future opportunities. To get that concerted action, several methods might be chosen, but a strong, well-financed coordinating and development body to handle research, commercial development of process, sales promotion and consumer relations certainly seems worthy of earnest consideration.

STILL OBLIGATED

OUTCOME of the Appalachian wage negotiations, at the time this was written, still was in the lap of the future. Whatever that future might prove to hold, however, it is difficult to see what the operators could have done, other than they did do, in view of the various government wage and price stabilization orders, including that of April 8—even stronger than those previously issued. Yet certain government people were busy trying to secure an increase in bituminous wages under such guises as a guaranteed work week.

These tactics raised a large question mark in many observers' minds. The New York *Times* of April 16 echoed the thoughts of many. "Is the administration," the *Times* asked, "preparing for another of those 'victories' over John L. Lewis in which Mr. Lewis gets substantially what he asked for in the first place?" Pointing out that the generally accepted interpretation of the government's proposal would require operation (or at least pay) not fewer than 312 days per year, the *Times* calculated this to mean an increase of 70 percent in annual wages as compared with pre-war normal years.

"It is true," continued the *Times*, "that Miss Perkins and Dr. Steelman are suggesting this for only a one-year contract. But they must know that they are putting the weight of the government behind the establishment of a precedent that Mr. Lewis would insist must be made permanent. How would such a plan be paid for? Would the mines produce 70 percent more coal? Where would the market be for such coal? Would the mines pay the men without mining the coal? Where would the money come from to pay them?"

The point to these questions is easy to see. The coal miners, to repeat an unchallenged conclusion, have just as much of a stake in the future of the coal industry as the operators and just as much of a duty to see that nothing is done which would prevent realizing the possibilities now in sight. Incidentally, certain government officials might well ponder that same conclusion.

ESSENTIAL ACTIVITY

COAL has done a big job in the war effort and has a bigger one ahead. To enable it to do that job, its key men need all the help, inspiration and information possible. The program for the 1943 Coal-Mine War Conference of the American Mining Congress (p. 70 of this issue) is designed solely with that end in view. It is an essential meeting to promote an essential activity—the winning of the war—and thus is strictly in keeping with ODT and other regulations on travel and meeting attendance. All men possible should attend, for the program promises real help.

SNOW HILL MAINTENANCE

Geared to Mechanical-Mining Methods

Performance of Face Equipment the Test—Surface Shop Facilities and Layout—Overhauling Loading Machines, Cutters and Locomotives—Underground Methods and Shop Facilities—Supply-Room Management

By HAROLD N. LOWRY
FRED R. MILLER
*and E. M. INGLEMAN**
Snow Hill Coal Corp.
Terre Haute, Ind.

THERE IS but one standard by which the efficiency of any mining-equipment maintenance system or program may be measured. That standard is performance at the face. Tons produced and cost per ton combine in the final result in a carefully planned maintenance system in which all departments, mindful of their own importance in the program, cooperate to the fullest extent to prevent lost time, unnecessary expense and other consequences of inefficiency.

In any mining operation, particularly one as large as our own, coordination of the various departments involved in mechanical and electrical maintenance presents a problem of considerable magnitude and demands a sympathetic understanding of the problems, needs and conditions by each foreman in all other related departments. It is the purpose of this discussion to present a general picture of our maintenance system, a system representing the combined efforts of all departments over a period of years, tried, tested and adapted to our particular needs.

Underground equipment at Snow Hill, the subject of this discussion, consists of:

12 Type 260 Goodman track loaders
1 Type 360 Goodman track loader
9 Type 324 Goodman track cutters
1 Type 1024 Goodman track cutter
19 Dooley post-mounted electric drills
6 10-ton General Electric locomotives
4 8-ton General Electric locomotives
1 7-ton General Electric locomotive
12 6-ton General Electric locomotives
15 pumps, various makes and sizes
1 Imperial air compressor, truck-mounted
1 Sullivan hitch-drill
265 mine cars (all-steel)

Power to operate this equipment is supplied by:

3 300-kw. General Electric rotary converters
1 500-kw. Westinghouse rotary converter
1 200-kw. Westinghouse rotary converter

From this group of machines two operating shifts per 24-hour day are scheduled for a production well in excess of a million tons annually.

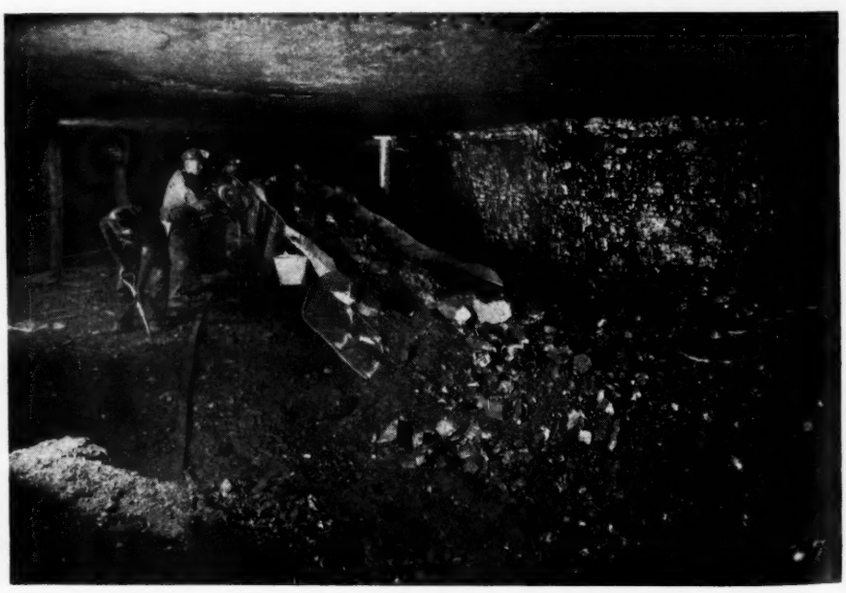
Regular use of equipment at present is as follows:

Day shift—
7 loaders in No. 3 seam
2 loaders in No. 4 seam
5 cutters in No. 3 seam
2 cutters in No. 4 seam
17 locomotives in No. 3 seam
4 locomotives in No. 4 seam
5 drills in No. 3 seam
3 drills in No. 4 seam

First night shift—
4 loaders in No. 3 seam (operating with skeleton crews)
2 loaders in No. 4 seam
6 cutters in No. 3 seam
2 cutters in No. 4 seam
18 locomotives in No. 3 seam
4 locomotives in No. 4 seam
11 drills in No. 3 seam
3 drills in No. 4 seam

All converters are used for both the above shifts; pumps and auxiliary equipment as needed. The second night shift is not available for either production or maintenance except for service and lubrication in No. 4 seam.

This distribution of major equipment to the actual working sections makes available a number of extra machines, sufficient to permit the periodic withdrawal of one of each type for complete overhauling. The remainder are stationed at the most advantageous points in the mine ready to go into immediate service in case



Loading machines, such as this one shown at work, are overhauled about every 16 months at Snow Hill; cutters, 24 months; locomotives, 18 months.

* Mr. Lowry is chief engineer, Snow Hill Coal Corp.; Mr. Miller, shop superintendent; Mr. Ingleman, purchasing agent.

Section of the main surface shop at Snow Hill. The electrical shop is upstairs in the rear.

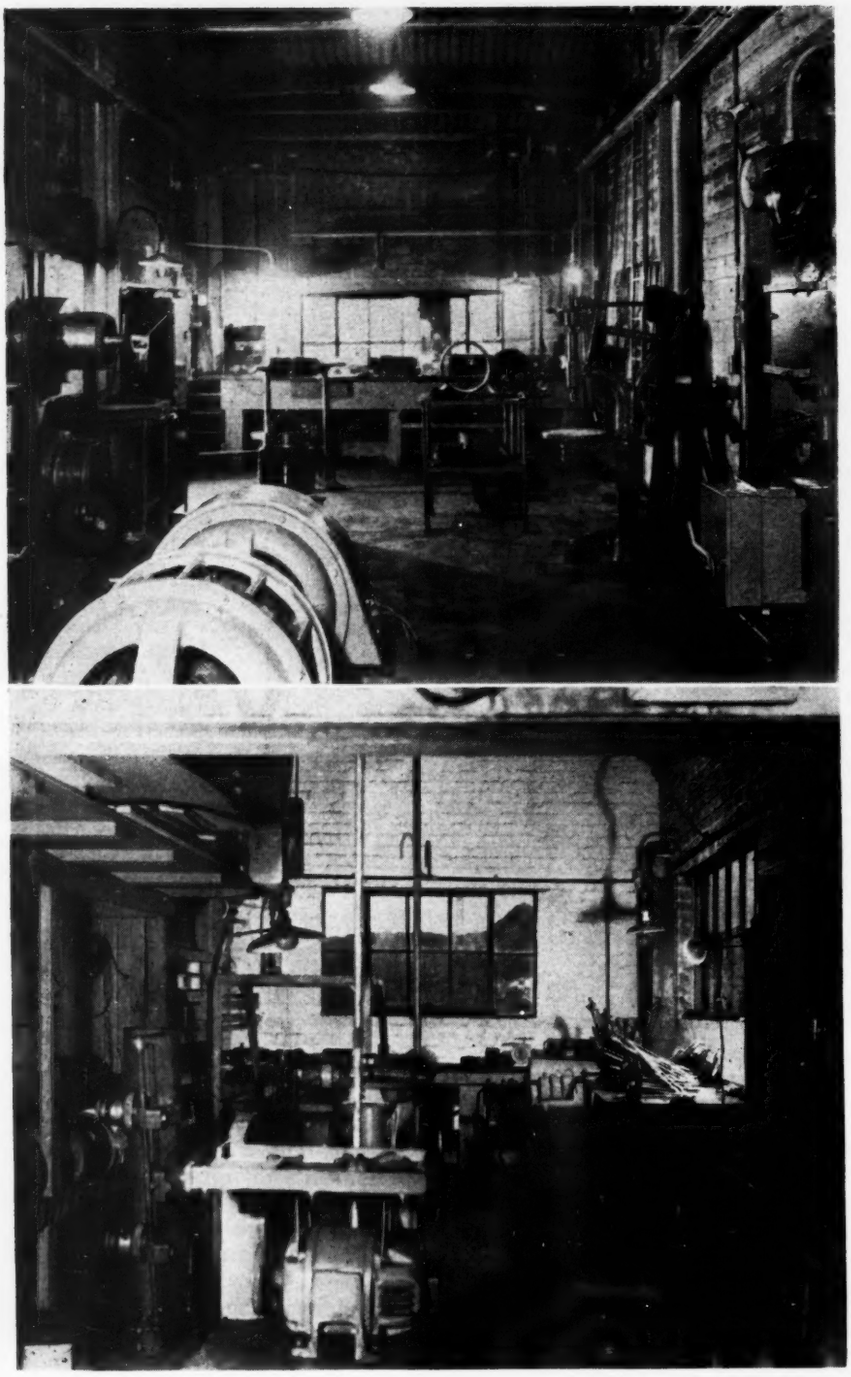
of a breakdown serious enough to demand a change of machines. The condition and availability of these extra machines must take second place only to the maintenance of machines in continuous service. Close adherence to this rule is the safety device, or "ace in the hole," of the general program. It goes far to nullify the retarding effect of unavoidable breakdown, mechanical failure and possible oversight, man failure or experimentation. It permits more time to do a repair job right instead of the all-too-prevalent "patch" job requiring a second doing and added expense.

Production machines are not required to "make it till quitting time," running—and frequently losing—the chance of part failure involving the destruction of other perfectly good parts. Production is maintained at a smooth rate and full value is more nearly obtained from every maintenance dollar spent. Thus it obviously is necessary that those responsible for devising and systematizing a practical maintenance program must so plan as to keep as many extra units available as is practical and still permit maximum time for repair. They also must anticipate and prepare for major repair work, especially overhaul jobs, to reduce to a minimum the time that a machine must be out of service. They must provide a repair and rebuilding cycle commensurate with production demands, the ability of the various types of equipment to withstand the rough usage to which they may be exposed, and to prevent the possibility of a bottleneck due to a persistent neglect of any type of machine, no matter how seemingly unimportant. A well-rounded program must consider these points, and only such a program can achieve the desired results.

The foremen in charge of the various maintenance departments are specialists, each charged with the responsibility of keeping up his end of the program, cooperating fully with other departments to permit a smooth flow of completed jobs, or, by proper care, lubrication and adjustment of equipment, get the most out of jobs already done.

The work of each department readily divides itself into three major parts: maintenance of operating machinery, rebuilding of equipment on a predetermined cycle, and the manufacture of such parts as is practical or which are not readily obtainable. While these three phases overlap in practice they are definitely separate in their connection with the maintenance system. In importance they should be ranked in the above order, and all departments should be amply manned and equipped to take efficient care of the first two, the slack being taken up in manufacture. Reclamation of used material is of great importance, especially during this war period, and should be made a definite part of any system both for the material saved and the economies effected.

The department foreman also must systematize the work of his depart-



Upper, armature department, electrical maintenance shop; lower, coil department.

ment to the point of best efficiency, but any such system must be flexible enough to meet the immediate demands of the production department. In other words, preference should be given to certain jobs upon which production may be dependent. Frequently the failure of a normally minor piece of equipment may seriously impair production or bring about the loss of many hours underground. Much time and thought usually has been given to the production system; therefore some confusion is bound to result from failure of a single link in the chain. Such occurrences result in rush jobs—possibly several at a time —or at least the placing of a practical time limit for completion. Hence it is necessary for a coordinator to keep in constant touch with all departments to direct the repair facilities into the proper channels of daily maintenance as well as to prepare equipment to meet the changing demands of a planned future.

Certainly deserving of more than passing comment is the preventive maintenance phase of any system. The ounce of prevention was never more valuable than in a highly mechanized and modern mine. Inspection, repair, adjustment and lubrication, to mention a few of the duties related to preventive maintenance, are vital factors which determine the value received from time, labor and money spent in rebuilding. Certainly there are enough non-preventable breakdowns (and in all fairness some breakdowns must be classified as non-preventable) to keep the repair crews fairly busy without permitting hot bearings, tight clutches, worn chains and the like to go unnoticed until a major breakdown occurs to heap more worries on the fast graying head of the maintenance foreman.

Last to be mentioned, but of prime consideration, is the method of supply of working material and replacement parts. A well-organized purchasing department is as essential as any other part of a maintenance program. It must purchase all necessary material, maintain a practical and comprehensive record of purchases and disbursements, determine a maximum and minimum quantity of thousands of items to be carried in stock and, in general, balance the stock with the demand. A close acquaintance with sources of supply, methods of shipment, comparative costs and service values are valuable assets in purchasing and are indispensable to the operation.

Maintenance Cost Cut

With due regard to these various phases and basic principles, our present maintenance system has been and is still being built. The result has been a maintenance cost which, from a previous high, has steadily decreased, particularly in 1942, in the face of greater cost of supplies and labor and the increasing age of the equipment, the lowest of which is from four to eight years. Details of the program are best explained by the department foremen in the following paragraphs.

Machine-Shop Practice — Equipment maintenance is the term applied to keeping the equipment in service and working properly. This, of course, is the main objective, but maintenance does far more, such as correcting defects, which, in turn, results in improvements. Proper maintenance is becoming a specialized part of mining. In fact, the types of machinery used in mechanical mining of coal are changing faster than we in the maintenance department can keep pace.

Electrical maintenance is a major subject, calling for much study. Push-

button controls, time-element relays, limiting devices, automatic contactor controllers, high-pressure hydraulic systems, control valves, bypasses, alloy steels with their physical properties; heat treatments, bearings (their load-ratings, lubrication)—all these and more are confusing to the average maintenance man. Because of his lack of understanding, much unjust criticism of the maintenance personnel has been the result. It is impossible to have trained men who know everything, but we are starting our seventh year with a definite maintenance plan and with men who have a working knowledge of the equipment now in use.

The demands of present-day mining require complete reconditioning of the equipment when deemed necessary. After a machine has been in service for a period of time, and numerous delays occur during the operating shift, the machine is brought to the surface and completely overhauled. By doing this we have reduced our lost time materially.

Our surface shop is 40x100 ft. with the stockroom adjoining. There is a 10-ton electric traveling crane to facilitate handling of heavy units. The shop equipment consists of one 24-in. lathe, one 16-in. lathe, one 24-in. shaper, one radial drill, one 21-in. floor drill, one 14-in. grinder, one 6x6-in. power hacksaw, one 60-ton screw press, one 150-ton vertical hydraulic press, and three 300-amp. welding machines.

There are two welding booths where most of our welding (with the exception of large units) is done. The welding equipment, such as electrodes, cutting torches, welding tips, etc., is kept in a cabinet provided solely for that purpose. At the end of the shift, each welder returns his equipment to its proper place.

There are work benches and individual tool cabinets for the use of the mechanics. Compressed air and 110- and 220-volt outlets are available at every bench. A part of the shop is used for storing patterns, jigs, templates, and tools for special jobs.

Blueprints are kept in a cabinet. These consist of drawings of the various equipment units, furnished by the manufacturer, and working drawings of parts to be made by the shop foreman.

The electrical department, on the second floor, takes care of armature- and coil-winding, and the repair of all electrical units. The equipment consists of a coil-winding machine, taping machine, and field-coil-winding machine, as well as all necessary testing instruments.

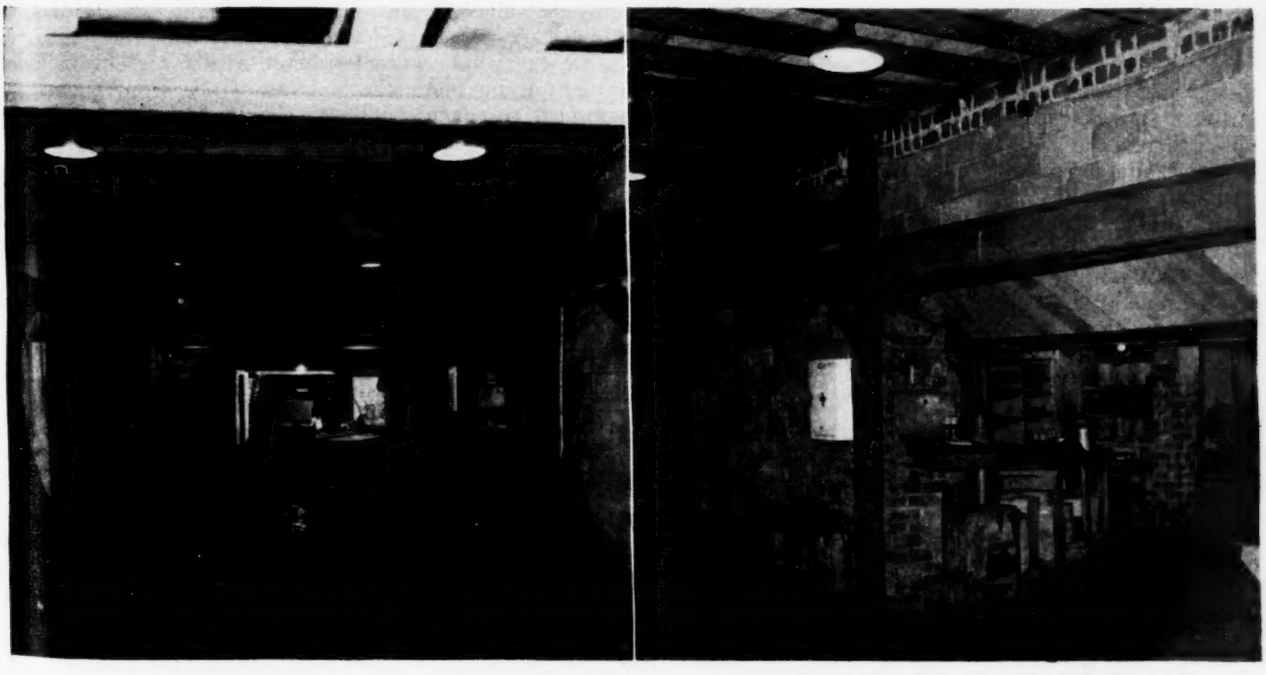
The forge shop is a 30x36-ft. building separated from the machine shop. Here the blacksmithing and sharpening and heat-treating of cutting machine bits is done. In this shop are a forge, a trip hammer, 12-in. grinder, Sullivan bit-sharpening machine, bit furnace and heat-treating equipment. A record of the number of new bits used and the number of bits sharpened and sent below each day is kept in the shop foreman's files, and a yearly report of the bit cost is made.

The personnel of the surface shop consists of: first shift—foreman, chief electrician, one machinist, one apprentice, three mechanics, two helpers, three welders, two armature winders, two helpers, one drill repairman, one blacksmith and two bit sharpeners; second shift—foreman, two machinists, one mechanic, one helper, two welders and one bit sharpener. This shop serves facilities producing some 5,000 tons of cleaned coal daily, all mined mechanically.

Foremost in our plan at all times is the safety of the men. All gears and pulleys are guarded; each man is furnished goggles for chipping and grinding; our cleaning solvent has a high flash point; and our crane, cables and lifting chains are carefully checked by the shop foremen.

Loader Overhaul—From past experience, we have found that our loading machines require an overhaul about every 16 months; cutting machines, every 24 months; locomotives, every 18 months. We overhaul the equipment with a view to uninterrupted service over a period of time.

When the time arrives for overhaul, a loader is brought to the surface in three sections—front boom, rear boom and truck frame. The truck frame is cleaned of coal and dust outside the shop, then brought inside for dismantling and checking for wear and breaks. The men strip the truck frame completely, clean, replace the trucks and paint in an eight-hour shift. This



Left, underground maintenance shop at Snow Hill; right, supplies and oil storage in fireproof masonry.

Bin sections, Snow Hill surface supply house.

is accomplished by first removing the front lifting-jack units, then the gear-case cover and side-swing unit. One man removes the guide plate from beneath the rack rail while the other removes the bracket for the rear conveyor. Then the bracket plate and bevel gear are removed and the turret frame is lifted off the turntable.

One man works on each side of the machine. The man on the right side removes the tramming lever, controller handle, 7-deg. shaft coupling and long 7-deg. shaft, while the man on the left removes the road-chain case and chain. Then the main transmission-case cover and mounting capscrews are removed, after which the main motor body capscrews in the transmission case are taken out. The two men remove the bumper, cross-beam, cable reel and cable guide, then the road-chain guard and chain on the right-hand side. The man on the right removes the fuse box, resistor and controller, while the man on the left removes the rear lifting jacks chain guard, chain and motor. The track for the rear conveyor, the guides and rear lifting jacks are taken off.

The main motor is removed and the transmission case lifted from the frame. Then the road-chain intermediate sprocket shaft and sleeve are taken off. The truck frame is turned over, the axles are removed and new wheels and axles put in place. The frame then is turned back, cleaned and painted.

After the turret frame and main transmission case are taken off, two men begin removing the units from them while the remainder of the machine is being dismantled. The turret frame and case are cleaned and checked for wear and breaks. The units to be used in rebuilding, having been previously assembled in preparation for the job, are put in place.

While the main transmission and turret are being assembled, two men replace the rack rail and then dismantle the front boom. If the front boom is to be repaired, the welder goes to work while the two men dismantle the rear boom. At present, we are rebuilding our front booms completely. If the front boom is to be replaced by a new one, the parts to be salvaged are removed and placed on the new boom. The gathering-chain guides, chains, idler roller, etc., are placed on the front boom.

Then the rear boom is repaired and worn pans and wearing strips are replaced. The rear conveyor driving unit is checked and necessary worn parts are replaced. The unit then is put in place. Then the idler rollers, conveyor chain, etc., are replaced. While this is being done the transmission case, turret motors, etc., are being replaced on the truck frame. When the front and rear booms are assembled, they are put in place on the frame.

After the loader is assembled it is lubricated, the proper adjustments are made and then it is tested. After testing, the booms are removed and the loader is painted, then sent to the underground shop for final assembly and adjustment. The average time and cost of overhauling six loaders is 566 man-hours; labor cost, $585.38; material cost, $1,086.93. This includes the building of new front booms.

In the shop foreman's files a record is kept covering each loader, cutter, locomotive and other equipment, showing dates received and completed, hours and cost of labor, cost of material, changes made, etc. An itemized record of material used is kept in the stockroom files.

Locomotive Overhaul—The method of overhauling locomotives, cutters and other equipment is much the same as that for loaders. A locomotive is brought to the surface and air-cleaned outside the shop, then brought inside for dismantling. First, the reel and top cover are removed. One man works on each side removing the brake rigging while another disconnects the motor leads. The stay plates then are removed and the frame is lifted from the trucks. Two men remove the motors and journal boxes from the axles, while

one man removes the controller and resistor. The two men clean the motor and remove the armatures. One man cleans, resets and paints the field coils and inside of motors, then removes the frame heads and checks the armatures and bearings.

If the tires and axles are to be renewed, the tires are removed and the wheels are pressed off and replaced on the new axles. Then the new tires are put on the wheels. One man repairs the brake rigging and sand rigging. After the motors are assembled, they are placed on the axles. The journal boxes are put in place and the locomotive frame is placed on the trucks. Then the brake rigging is assembled while the resistor and controller are being repaired and put in place. The reel motor and headlights are checked and installed. All wiring is checked and leads are connected. Then the locomotive is tested. The reel and top cover are replaced and the locomotive is painted and sent to the underground shop.

The average time consumed in overhauling 14 locomotives is 196 hours; labor cost is $188.96.

The overhauling of cutting machines is done in a like manner. The average time required in overhauling five cutters is 235 man-hours; cost, $227.78.

Extra units for the different machines are rebuilt in the shop as the demand warrants. Where it is impossible to carry extra units, such as those for preparation machinery, a stock of shafts, pulleys, gears, bearings, etc., is kept ready. Extra parts, such as shafts, axles, bushings, collars, etc., are made or reclaimed during the intervals between the overhauling jobs. We try to have not more than two pieces of equipment in the shop at one time, thereby minimizing the number of machines necessary for the operation, as well as the time the equipment is out of service.

Mine cars are repaired and greased in the machine shop. Each car is numbered and a record of repairs made is kept in the shop foreman's files.

At the end of the shift, each man fills out a time slip showing the time worked on each job. From these time slips a monthly labor report is made, showing the daily shop labor cost on loaders, cutters, pumps, tipple machinery, etc. From these slips also the labor cost of each job is taken. The workman's time is recorded in a time book which is turned in to the office each day.

Preventive maintenance is all important in a plant, and any weakness in this department will be reflected in the performance of the plant equipment. Servicing of the equipment likewise is very important.

Underground Maintenance — The chief concern of the underground maintenance department is the repair, inspection, adjustment and lubrication of all equipment as well as the installation and maintenance of power lines and power equipment. Much depends upon the efficiency with which these duties are performed, since production is directly dependent upon the condition of equipment actually in service and the power with which it is supplied. Preventive maintenance is the keynote of our underground system; valuable time and supplies can be saved by proper emphasis on this part of the work.

Underground Maintenance Staff

The personnel of the underground maintenance department consists of: No. 3 Seam—one day-shift chief, seven electricians; one second-shift chief, eight electricians; No. 4 Seam —one day-shift chief, three electricians; two second-shift electricians; one third-shift electrician. The Nos. 3 and 4 seams are operated independently and all departments are separate except maintenance, coal preparation on the surface and that part of the supervisory personnel responsible for both mines.

These men take care of all maintenance, lubrication, wiring and power supply underground. While all come under the same classification and take care of or assist in any branch of the work, they may be divided for any single day of 24 hours as follows: No. 3 seam—Repair and maintenance, 6; service and lubrication, 4; wire and power, 3. No. 4 seam—Repair and maintenance, 3; service and lubrication, 1; wire and power, 1. One man is absent each day in each seam to make a crew available for week-end work.

As the maintenance systems in both seams are essentially the same and the equipment is divided in proportion to tonnage produced, the following paragraphs will pertain to the No. 3 seam only.

The underground shop is of concrete and steel construction, approximately 18x54 ft. with a small supply room, a bench-work room and a wiring-supply room adjoining. It is equipped with two chain-operated traveling cranes of 2 to 3 tons capacity each, one track-mounted welding machine, one service truck equipped with cutting torch and tanks, a portable drill and grinder and all hand tools necessary for normal repair work. For the lubrication of loading equipment there also is a portable all-steel truck equipped with a compressor, air-operated pressure guns, 40-ft. dispensing hoses and tanks for all types of lubricants used. A second truck of similar design is under construction.

In the shop floor also are two steel-lined repair pits, one 12x3x4, and one 6x3x2 ft. Supply and wire stations also are maintained at points inside the mine adjacent to loading sections where a small quantity of parts frequently used is kept to supplement the supplies actually carried by the machines. Extra parts and units for loaders, cutters and locomotives repaired by the surface shop are kept in the underground shop ready for installation when necessary.

Daily inspection of all equipment is a duty of both the day and night chief electricians. The day reports on equipment in operation, if any adjustments or minor repairs are needed, are turned over to the night foreman, on whose shift most of the machines are available. The night reports of work done, with further recommendations or requests for supplies, are in turn left for the day chief electrician.

Still a third report, especially on loading equipment, is available from the lubrication and service crews, of which there are two of two men each. These men lubricate all loaders daily, inspect and service all chains and accessible drives and report to the foreman any needed replacement of parts which time does not permit them to install. In this manner the equipment is closely checked daily and kept in good repair.

As mentioned previously, one machine of each type—loader, cutter or locomotive—can be withdrawn from service for rebuilding and repair at any time. During the period in which any one of the three is in the top shop, the other two units are utilized to permit a cycle of machines to be put through the underground shop for thorough checking, adjustment, replacing of units, guides, pans, drives, etc., and general tuning-up. By this method many potential breakdowns are avoided and valuable repair time is gained without interfering with the producing units or the regular standby equipment.

Woven into this system of inspection and repair is a schedule of work which it may be well to note:

Loaders—General lubrication and servicing of chains are daily duties of the service crews. Armature bearings are greased once a week. Cable reels, motor brushes, wiring and controllers are checked each month. The service crews are assisted by a repair

mechanic when periodic checks are being made, each crew being assigned as many machines as time will permit to do the work thoroughly.

Cutters—Daily lubrication of cutters is the responsibility of the machine operators, oil cans and guns being carried on each unit. Lubrication of rear armature bearing and feed-motor bearings every 60 days, checking of motor brushes once a month, cleaning or renewal of oil waste packs every 60 days, are duties of the maintenance department. Other inspection and repair, as previously mentioned, is taken care of at the discretion of the chief electrician.

Locomotives—Because a large majority of the locomotives are in almost constant use and the unavoidable lack of third-shift repair, servicing of these units presents quite a problem. However, by utilizing every possible opportunity, and keeping a close watch on the servicing records, a reasonable schedule of repair and servicing is maintained. Main haulage controllers are serviced daily; other controllers once a week. Each motor is equipped with a 1-gal. oil can and a hand gun for daily lubrication of the motor by the operator. Motor brushes, reels, brakes, resistors, journals and axle brasses, oil waste packs, and wear plates are checked each 60 days in the shop. Armature bearings are greased every 90 days.

Coal Drills—All coal drills are serviced in the surface shop, where adequate testing and repair facilities are available.

Power Equipment—All power-converting units are inspected daily by the electricians who are responsible for their starting and stopping, as well as by the chief electricians. Converters and switchgear, all of which are housed in ventilated steel and concrete rooms, are thoroughly cleaned by compressed air every 30 days. Transformer oils are tested periodically and the oil is renewed or renovated every two years.

Reports and Records—All maintenance foreman keep a daily record of repairs and installations of major parts such as armatures, transmissions, cutting chains, clutches, trailing cables, certain bushings and bearings, sprockets, shafting and drive units. These records provide the department with a general idea of the condition of the equipment as well as basis for possible redesign or strengthening of parts to increase their useful life. A file of loader lubrication reports maintained over a period of years has led directly to a general decline in our lubrication cost and the setting up of a method of storage, distribution and application of lubricants designed for speed, efficiency and cleanliness.

The entire maintenance system is not yet complete and only the more optimistic would expect it to function perfectly. Unexpected breakdowns can and do occur, but it is significant that the more closely a predetermined plan of maintenance is followed, the less frequent they may be.

Supply-Room Management — The supply-room manager and purchasing agent at today's modern mechanized coal mine—a mine supplied with the most practical equipment, both for the production of coal and the safety of the men, and with a yearly production of well over one million tons—must always be alert and wideawake. Very likely his efficiency will be determined by the ability he possesses, supplemented by the advice of his superiors. He must be able to select and arrange a well-balanced stock of parts and supplies, thus assuring for the operation the least loss of time and, at the same time, holding inventory to the lowest possible figure. It has always been the policy of the management of our company to keep in stock the parts and supplies necessary to insure the greatest efficiency possible in operation of the mine as well as the safety of the men.

Stores Location Important

Location of the storeroom should be given earnest consideration. In some cases, certain supplies might well be kept handy underground in limited quantities, but where the main machine shop is on the surface the main supply room also should be there. The size of the room is of primary importance. Six years of experience at our Tallevdale and Fayette mines has taught us that supply rooms can be built too small. We have enlarged ours three different times.

The next consideration is storage bins. One should not make the mistake of allowing the bin manufacturer to design the bin arrangement, since he will not have knowledge of the wide variation of parts and supplies to be carried in stock. We have found it far more efficient to have these bins shipped knocked down, and then have them erected under the guidance and supervision of a person familiar with the stock requirements of the operation. Care should be taken to build each bin compartment to house each and every part properly, leaving space for new parts that may be added.

The parts bins always should be so placed and the compartments so arranged that the fast-moving parts and supplies will be the closest to the place where they are given out; our choice of supplies in the closer bins are the bolts, capscrews, nuts and washers. When the bins have been erected and the compartments arranged to suit the parts, each bin section, starting with the first section, should be progressively lettered or numbered—for example: A, B, C, D, or 1, 2, 3, 4—until all sections are designated. Then each compartment should be numbered; for example: top row—100, 101, etc., until completed; second row—200, 201, etc., until completed, and the same procedure followed from top to bottom until all compartments in all sections are numbered in the same way and in a legible manner.

Our plan for stocking any particular type of mechanical parts for cutters, loaders and all other machines of the same make is to arrange all gears, pinions, bushings, brushes, etc., in separate groups. This results in a better looking stock display and facilitates easier and quicker handling of the stock.

We must next set up a system whereby our parts may be easily found. We favor the system of perpetual inventory cards which have the number of the part, its name, section number and compartment number from left to right on their lower visible edges. The cards are put in the files in numerical order according to the parts numbers.

There must be a way of finding parts or materials needed. Either the supply-room clerk or the mechanic requiring the part must know its number. Consider, for instance, loading-machine parts. We have hanging by the parts counter a complete parts catalog on one sheet which was designed by our machine-shop superintendent, and which shows the name and number of every part used. These parts are classified on the sheet according to the particular unit of the machine in which they are used, and these units in turn are designated not only by the manufacturer's name but also by the names which our mechanics have for them, which cannot be found in the manufacturer's catalog. These sheets are framed and put under glass so as to preserve them and keep them clean; one hangs over the work bench of each of our shop mechanics.

Such sheets are great helps and time savers for the supply-room clerk, for when Jake, the mechanic, who rebuilds loading machines, comes to the counter for a part he has first looked at this one-page catalog to get the correct number of the part. He tells the clerk the number of the part he needs, the clerk goes to the perpetual inventory card bearing that number.

getting from that card the section letter and bin compartment number. He then gets the part without delay, and thus gets Jake back to his job as quickly as possible.

We also may have a call for a part from a mechanic who may not have a catalog and does not know the part number. In this case, the clerk gets the number from his own parts sheet hanging before him and, in the same manner as before, obtains the part for the mechanic, sending him on his way with very little delay. This is one way in which the supply department can and does help the maintenance department hold down the cost of upkeep, enabling the superintendent to smile his appreciation after reading the cost statement.

Proper Accounting Vital

The supply-room accounting system is of great importance, requiring very careful and efficient work and the close cooperation of everyone who takes part in receiving and issuing supplies. We use the Acme card-file system, which has given excellent results. In this system, there are 18 card tills to a case and 80 cards to each till, making a total of 1,440 cards to each file case. At present, we have three of these cases filled, or well over four thousand cards. These cards, together with half again as many parts of minor importance for which we keep no card record, go to make up a total of approximately 6,000 items which we must handle.

The file cards are 5x7 in. and are divided into three columns. The first column represents the quantity and value of supplies received, the second the quantity and value of supplies used, and the third the quantity and value of the supplies on hand. In issuing parts and supplies, we use a small storeroom requisition blank on which is recorded the number of the part given out, its name or description, the department to which it is to be charged, and the signature of the person receiving it. Material is charged out from the inventory cards the first thing in the morning following the day on which it is disbursed, the quantity used and cost being entered in the second column and the balance on hand then brought up to date in the third, or right-hand, column.

When shipments of parts or supplies come in to the mine, they are checked very closely with the orders on which they were shipped, and then the packing slips are filed. When the invoices for these materials come in, they are checked for accuracy both with the orders and packing slips and, if they are found to check, one copy of each is turned over to the superintendent for his O.K. After he has approved them, they are ready for payment. We keep one copy of each invoice in the stockroom, from which we do our posting on the debit, or lefthand, column of the proper inventory card, bringing the new balance on hand across to the third column. We also keep a daily record of the total quantity of parts and supplies invoiced, parts and supplies used, and the total quantity on hand.

With the different preference ratings, government orders and schedules and reports now required, ordering of supplies for a large mechanized mine today calls for a great deal more thought and work by the purchasing agent. As mentioned hereinbefore, we stock approximately 6,000 different supply items. These items must always be in stock, in their proper place, and properly identified, so that there will be no delay in operation caused by the supply department.

We in the mining industry are blessed in having at our command a goodly number of efficient manufacturers, jobbers and salesmen always ready to render service to the purchasing departments and who, under present conditions, have been doing a very good job. We must, however, prepare for worse days to come. We must learn to do with less and to keep every machine, wire rope, etc., properly lubricated and all other equipment efficiently serviced every day, so that we will use far less supplies of all kinds than in the past. In this way we will be a great help to our government in furnishing our boys everything they need to insure victory in the world battle for democracy.

ON ORDER NOT SHIPPED				RECEIPTS				DISBURSEMENTS				ACCT. CHARGEABLE	BALANCE			
DATE	REQ. NO.	QUANTITY	ORDER NO.	DATE	NO. RECEIVED	PRICE	AMOUNT	DATE	NO. USED	PRICE	AMOUNT		DATE	NO. ON HAND	PRICE	AMOUNT
				1942									Inventory - 1/1/42			
		6	10435											0		------
		2	"	1/7	4		110 88						1/7	4		110 88
								2/18	1		27 72		2/18	3		83 16
		0		3/12	2		55 44						3/12	5		138 60
								4/4	1		27 72		4/4	4		110 88
								5/5	1		27 72		5/5	3		83 16
		4	11294					6/17	2		55 44		6/17	1		27 72
								8/1	1		27 72		8/1	0		------
		2	"	8/13	2		61 60						8/13	2		61 60
								9/20	1		30 80		9/20	1		30 80

R.P.M. OR STROKE — CODE NO. — UNIT

SHOP NO. — Supplier - Goodman Mfg. Co., Chicago — B.P. NO. — PATTERN NO. — WEIGHT — VOLTAGE OR WORKS STEAM PRESSURE

(for 324A Goodman Slabbing Machine)

ARTICLE 93338 Bevel Pinion — CARD NO. — BIN NO. D - 505

ML-S-42-210

STOREROOM REQUISITION

DATE 9-20-42

SNOW HILL COAL CORPORATION

QUANTITY	ARTICLES	AMOUNT	CHARGE
1	93338 Bevel Pinion	30 80	Cutters

Received by Jake Hoffer — Foreman A R Miller

Above, one side of double-faced perpetual inventory card; below, specimen requisition for parts.

READING'S SILT BASINS

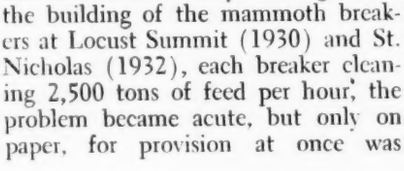
Protect Streams and Save Valuable Coal

Dams of Breaker Refuse at Locust Summit and St. Nicholas Breakers Provide Large Reservoirs Into Which Are Pumped the Minus 3/64-In. No. 5 Buckwheat Which These Mammoth Cleaning Plants Discharge

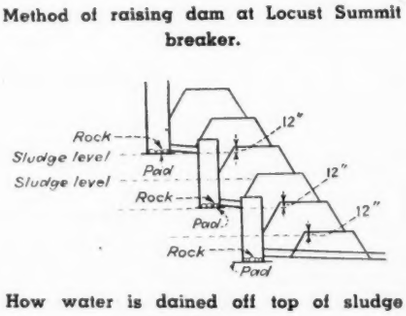
HOW TO DISPOSE of the fine sizes of anthracite which most industrial concerns are not equipped to use is a problem that is perplexing anthracite operators more and more as the Army protests against the silting of navigable rivers and the public inveighs against the introduction of solids into any water that is to be used in boilers or for domestic consumption. Other objections are based on the unfitness of silt-laden streams for recreation and the growth of fish, and nature lovers declare that the coal has darkened the waters and smothered vegetation with piles of fine coal. The best solution undoubtedly is to convince industry, power-plant owners and others that they will profit by investing in plants that can utilize these fine sizes of coal. Meantime, many coal companies are exerting every effort to conserve their fine material for future market demands.

Buckwheat No. 4 (⅜- to ¾-in.) already is beginning to find its place in industry, but buckwheat No. 5 (¾-in. and under) has had fewer users and until the last ten years had not acquired even a name. Yet when it is recalled that all the sizes below chestnut were at one time almost unsalable and had to be thrown away or stocked and that one by one in turn pea and the four larger buckwheats found buyers, it seems certain that before long buckwheat No. 5 will find its purchasers and proponents, and a size, buckwheat No. 6, may be developed to take care of the finer half of that fraction. The trend seems inevitable, but hitherto has been too slow. Certainly with one company alone, the Philadelphia & Reading Coal & Iron Co., laying aside 900,000 tons of buckwheat No. 5 a year and having 35,000,000 tons in storage, there should be enough of such materials available that supplies always will be forthcoming at a suitable price to return far more than the cost involved in converting equipment to suit the combustion of such fine coal.

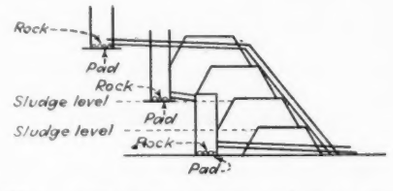
Inquiry indicates—and the presence of slush ponds at all the collieries of the Philadelphia & Reading Coal & Iron Co. confirm the fact—that, from the very inception of wet cleaning, the unsalable fines were put into storage. At first included in this slush were the larger buckwheat sizes, but, as the market broadened for the smaller coal, only the finest had to be conserved by slushing. With the building of the mammoth breakers at Locust Summit (1930) and St. Nicholas (1932), each breaker cleaning 2,500 tons of feed per hour, the problem became acute, but only on paper, for provision at once was made to secure places of lodgment for the tremendous volume of fine sizes that these big breakers inevitably would collect and would have for disposal.



Method of raising dam at Locust Summit breaker.



How water is dained off top of sludge by boxes.



When water boxes clog, a box is constructed to take water down face of dam.

Locust Summit breaker receives all the coal from mines in the Mt. Carmel, Shamokin and Ashland districts and the St. Nicholas breaker cleans coal derived from mines in the Shenandoah, Mahanoy and Tamaqua areas. In both breakers, the fine sizes are cleaned by Hydrotators and sized on long relatively fast well-laden reciprocating screens supported by Parrish arms. In each plant, all coal below ¾-in. goes to a Dorr thickener, 150 ft. in diameter, in which the coal is slowly raked in a circular path.

The underflow water, which contains the No. 5 silt, is pumped to the slush pond, and the overflow furnishes the circulating water with which the breaker feed is washed. Locust Summit uses 42,000 g.p.m. for circulation and 2,700 g.p.m. to make up for water lost in washing and sprinkling and in delivery of fine coal to the slush pond. St. Nicholas uses 40,000 g.p.m. for circulation and 3,500 g.p.m. for make-up.

In both instances, two 8-in. pipes are used to transfer the slush from the thickener to the slush pond. Those at St. Nicholas breaker are each 1,795 ft. long and of cast iron. That material is preferred for its longer life, but at Locust Summit a relocation was necessary when the new slush reservoir was constructed and, steel piping being available, it was used. Both materials are giving good service.

Even in the winter, the slush is fairly warm as it leaves the breaker, and, because it travels at a high speed and has about 15 percent of solids, it has no opportunity to freeze, even though the pipes are uncovered throughout their length. At night, when the breaker is idle, the system is emptied.

At St. Nicholas, the water is driven

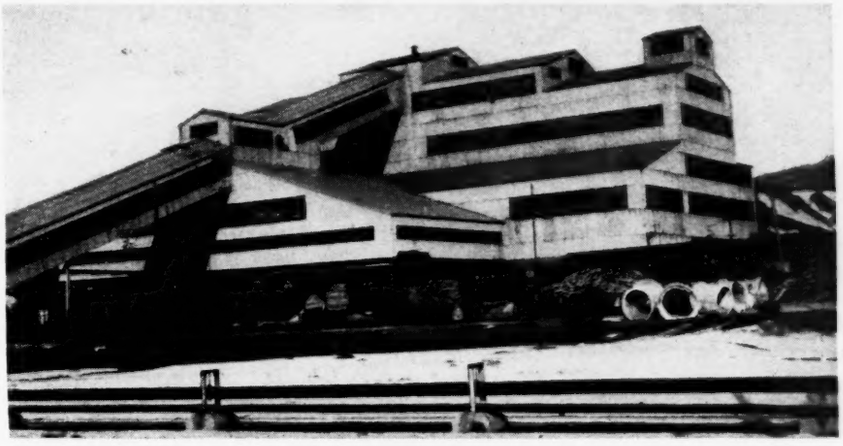
through the pipes by two pumps, each consisting of a 250-hp. motor with shaft extended on each end and connected directly to a Morris 6-in. centrifugal pump with the pumps on each end of the shaft connected together, forming a two-stage pump. There also is a standby unit of the same make for use in an emergency. Locust Summit has two 250-hp. two-stage Morris pumps of the same general type. All pumps are driven through Tex-rope drives. The total capacity of the equipment for delivering slush water at each breaker is 2,500 g.p.m.

At Locust Summit, two slush basins have been provided. The first was located near the breaker, 2,900 ft. long and 300 to 850 ft. wide, as the pond had to conform with the natural curvature of the terrain. Where the ground is lowest, the dam is now 107 ft. high. The pond is located around a stream so near its headwaters that it has almost no watershed and therefore never rises excessively. The terrain above it is furrowed by the Merriam stripping, which divests the stream of all its water, making a diversionary channel unnecessary.

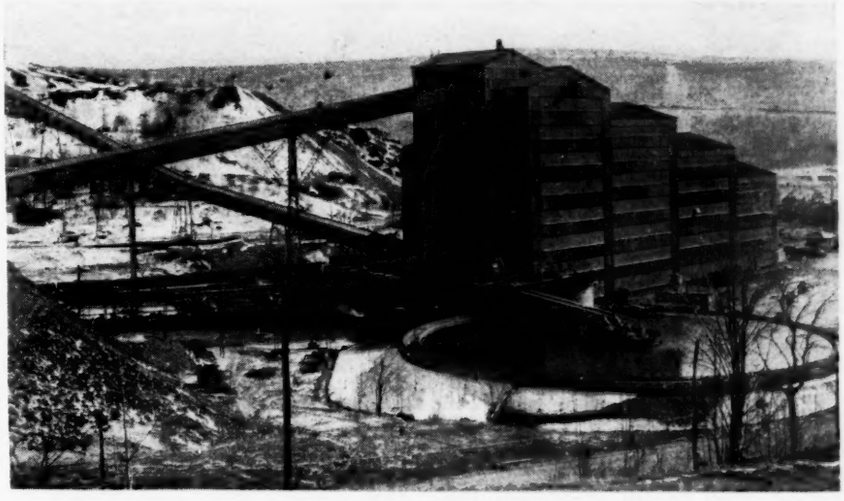
This first dam was made of breaker refuse laid in vertical increments of 5 ft. which were added as the slush rose in the pond bed. Had a dam about 100 ft. high been constructed at the beginning of the operation instead of incrementally and as the silt was deposited, not only would a large sum of money have been invested long before it was needed but it also would have been necessary to give this earthwork an appropriately broad footing that would have been very costly.

Instead, at first, only a low mound of breaker refuse was constructed around the site and, when it was necessary to raise the sides and ends, 1x8-in. stakes 7 ft. long were driven in a long line 2 ft. deep around the pond and set 7 ft. back from the outer edge of the mound; thus the size of the surface of the pond was reduced in all directions with each increment of height, in this manner giving stability to the rising structure.

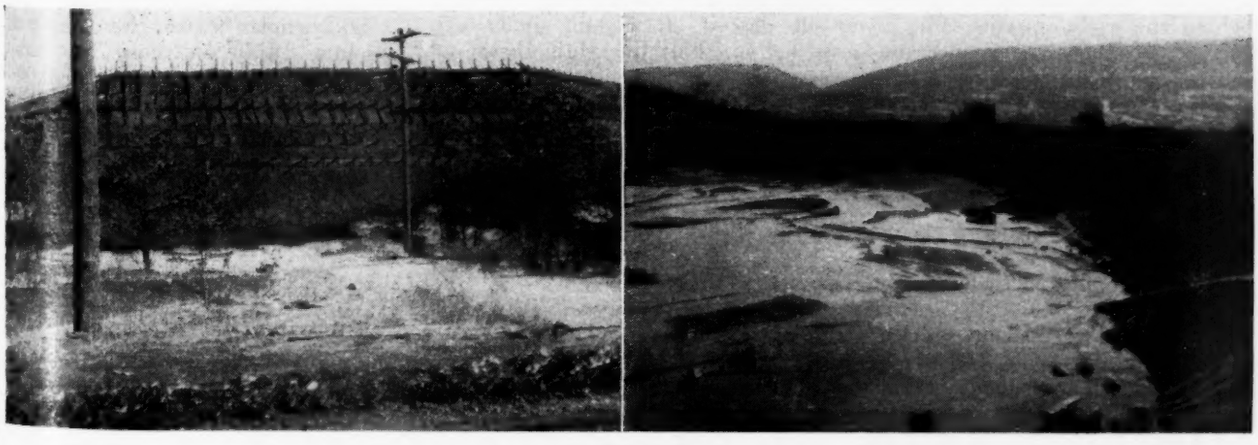
These stakes were elbow-braced to tops of stakes that had been driven in the next previous increment of breaker refuse erected prior to a previous raising of the slush level. A solid backing of mine refuse later,



Locust Summit breaker.

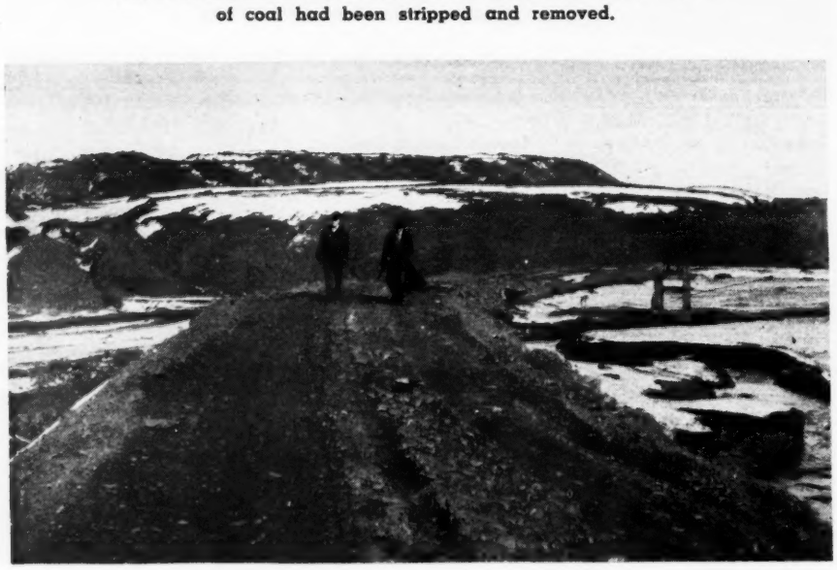


Breaker at St. Nicholas.



Left, silt pond No. 1 at Locust Summit breaker; right, silt pond No. 2 at Locust Summit with truck and bulldozer raising breaker-waste dam.

Part of silting basin No. 2, Locust Summit, where a stray deposit of coal had been stripped and removed.



Top of dam which confines silt near St. Nicholas breaker; pond to the right after water was lowered.

backed again by silt, completed this new deck and provided part of the footing for a new increment. As at no time was there any depth of water behind the walls of refuse this gave good results, but it consumed much timber and many manpower hours. For this reason it is no longer in use. Box drains, similar to those described later, were used to keep the water from overflowing the reservoir, at least in an uncontrolled manner.

Eventually, the structure became quite high and as a deep cut had been made in the Merriam stripping which removed the coal from an isolated virgin basin just back of the reservoir, to which reference has been made, it was thought best to throw a dam across that cut and use it as a slush basin replacing the earlier one. To build the dam, material from nearby refuse banks was excavated with a power shovel, distributed by trucks and smoothed off to the required lines by a bulldozer. This dam has risen more rapidly than the silt deposit. It is still under construction, but the slush basin already is in effective use.

In this instance, the sides of the basin for the greater part are faced by the material displaced by the strippers in their operations, and the reservoir will cover a 12-acre area, 2,500 ft. long, 160 to 450 ft. wide, and the height where the ground is lowest will be 147 ft. The dam will have a length of 2,500 ft. It is now so completely filled with silt that the water overflows through box drains as in the first slush reservoir. It also passes slowly through the dams and evaporates from the exposed surface, and some little water probably seeps into the mines.

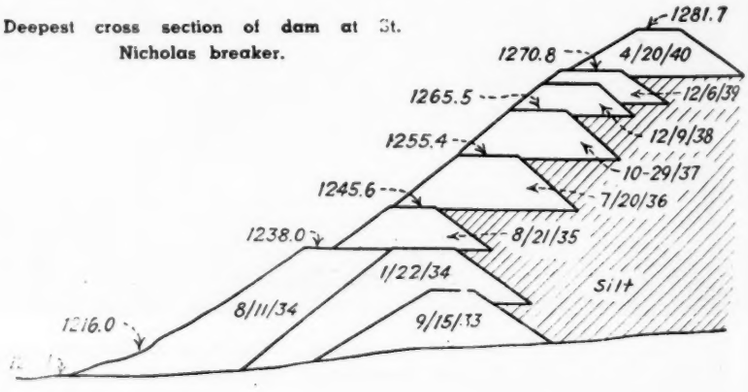
At St. Nicholas, the Philadelphia & Reading company decided to put its dam on the top of a hill back of the breaker, where large piles of breaker refuse had been dumped, though not on the actual site designed for the slush basin. The advantage of such a location is that there can be no natural water inflow to prevent the settling of the solids nor any water to cause an erosion of the dams around the basin.

Here the dam was built by increments of 7 ft. as fast as needed by the steadily growing storage of silt. When placing a new incremental addition, a 3-ft. berm always has been left at the outer edge of the dam. The fill thus made, using material from an old refuse bank, is 7 ft. high and 10 to 14 ft. wide at the top with slopes of 1½ to 1 on either side. A bulldozer is used to level the surface and make a slope to cover the 3-ft. offset left on the outer face of the dam.

At this location, as at the first dam erected at Locust Summit, the material at any given station rests partly on the previously dumped and consolidated breaker refuse and partly on the consolidated silt in the storage basin, as is shown in an accompanying cross-section, a type of construction found satisfactory.

St. Nicholas breaker was completed in July, 1932, and since that time 6,700,000 cu.yd., or about 5,000,000

Deepest cross section of dam at St. Nicholas breaker.



tons of slush on an air-dry basis, has been deposited. The plan of the dam is like a shepherd's crook, being hooked around at one end. It is 3,900 ft. long and 66 ft. high over the lowest point of the terrain. The pond covers 90 acres. From the sludge pumps at the Dorr thickener to the point of discharge at the slush basin the difference of elevation is 144 ft.

When the silting basin was constructed, 24x12-in. wood drain boxes were provided through the breast at the base of the dam each with a vertical woodbox as high as the breast and of 4x4-ft. cross-section, down which the water could pass through the dense silt to the drain box. These vertical boxes, which were 12 to 15 ft. high, are set down on a pad of timber and when the box is in place the bottom of the box is protected by a layer of rock. When the pond fills with sludge within 1 ft. of the top of the dam, the latter is raised by dumping more breaker waste thereon. Later, at intervals, as the height of the dam was increased and its face was sloped back, other horizontal drains were laid and other shafts erected to the temporary surface, so that the water escaping from the silt could travel by these big steps down to the drain box at the base of the dam and thence to the gully of the terrain. But in some instances these drainage ways silted and had to be abandoned; then new drainage boxes 24x12 in. were constructed and laid through the dam near its top and others of 12x24-in. cross-section were laid down on the face of the dam to protect it against the erosion of the escaping water.

The overflows from the basins contain from 1 to 7 percent solids and the material that is transported by the effluent is mostly so fine that it will pass through a screen with 325 meshes to the inch and, as it has 40 to 50 percent of ash, it has no commercial value. When air-dried the weight of the slush coal is about 55 lb. per cubic foot.

By the means described, the Philadelphia & Reading has managed to produce almost a clear effluent, far clearer than comes from farms and highways. From a bacteriological standpoint it is far more desirable than that derived from either of these sources. Such fine material is incapable of silting the streams as it would all travel to the sea and so would in no way decrease the navigability of the waterways.

Plans are already under way for laying out a further silt basin both at St. Nicholas and at Locust Summit as soon as the present basins are raised to their full height and completely filled with silt.

TRUCK MINES

Progress in Mining and Preparation

Truck Operators in Williamson County, Illinois, Progress With the Times—Electrification and the Use of Machinery Grow—Preparation Improvements Include Beneficiation of the Fine Sizes

MAKING a job to support the family brought the wagon mine into existence. The same economic upset that started "bootleg" mines in anthracite territory — lack of employment — boosted the bituminous wagon mines of Williamson County, Illinois, into a million-dollar business. Concrete highways made them independent of railroads and lifted them into the more important class—truck mines. Truck mines of this country are now an established business, supplying a large domestic trade and many small industries in a half dozen States.

Some 10.16 percent of Illinois coal was produced by truck mines in 1940. Of this, Williamson County accounted for 651,492 tons. Only St. Clair County, across the Mississippi from St. Louis, produced more—1,233,815 tons. In that year, the State's truck mines produced more coal than any one county except Franklin.

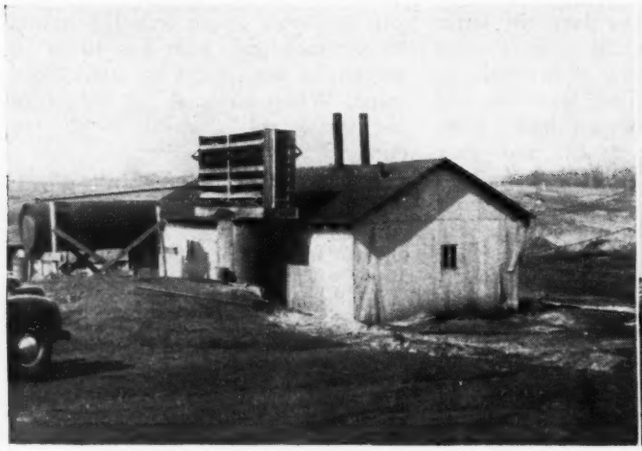
For 1941, total Illinois tonnage was up 10.7 percent, but total truck tonnage was down 16.8 percent. Williamson County truck tonnage, however, kept pace with the entire State.

The accident record of truck mines as a whole is not so good. In 1940, truck mines accounted for 15.46 percent of all fatalities. Williamson County truck mines fared better, with one fatality per 651,492 tons, being even better than the rate for shipping mines in the county (648,899 tons per fatality). The 1940 record for all mines in the State, 624,603 tons per fatality, was the best so far achieved, except for 1937. In 1941, the State accident rate was up a trifle, but the truck-mine rate was up sharply to 242,448 tons per fatality.

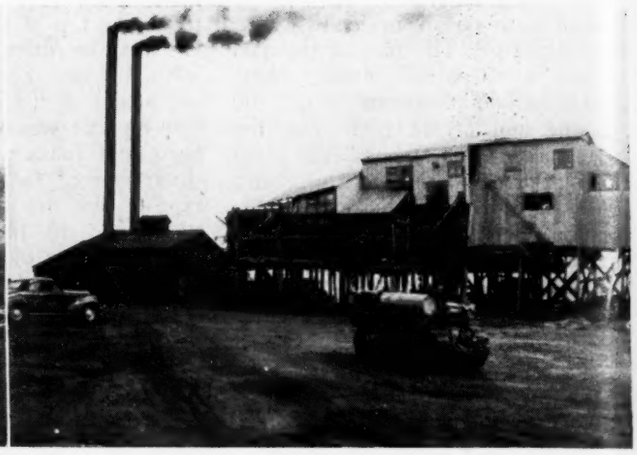
Williamson County truck mines are a fair example of what may be found in many sections of the Middle West. These mines run from family affairs to corporate entities and, according to the 1940 coal report of the Illinois Department of Mines and Minerals, employed from 2 to 47 men at each operation. There were 69 mines with yearly outputs of from 39 to 63,562 tons. Half of them are grouped around the tiny village of Crab Orchard, making it the truck-mine metropolis of several counties.

Unlike the bootleg anthracite mines, these organizations own the coal they work or operate under lease from the land owner. They are coal operators and their production is included in the Illinois State figures.

For most part, these mines recover the No. 5 seam of coal, averaging 52 in. in thickness. A few work the No. 6 seam, averaging 102 in. in thickness. These are the same veins worked by the neighboring commercial mines. The vast majority of the little mines are developed by slopes, with gasoline, steam or electric hoists. One of the early power units was a Dodge automobile engine, salvaged from some junk yard. The horse-driven hoist disappeared with the advent of



This power house contains a 150-hp. diesel engine, belted generator and electric hoist.



Steam-operated truck mine with its own electric-generating equipment.

the auto graveyards and widely distributed electric power.

Preparation facilities range from the simple bar screen, making lump and screenings, to a great variety of shaking and revolving screens. Separate rescreening plants for sizing stove and stoker coals, and for separating carbon, are found here and there. Many of these plants do a creditable job of sizing. Since the control of dust has become so important for household coal, oiling was practiced at most of these mines until the war banned its use. Application was by hand sprinkling or by power sprays. Several mines have very good power spray outfits, even to steam or electric heating of the oil tanks.

The system of mining is room-and-pillar, as is general throughout southern Illinois. There are variations, just as in larger mines. Lack of definite planning and engineering guidance is responsible for the slipshod manner in which mining often is carried out. The scarcity of mining engineers and their schedule of fees are both factors.

Some 70 percent of the coal is cut with 32 mining machines installed at 27 of these mines. Drilling is mainly by hand. Shooting is principally with black or pellet powder. However, two of these mines use Cardox.

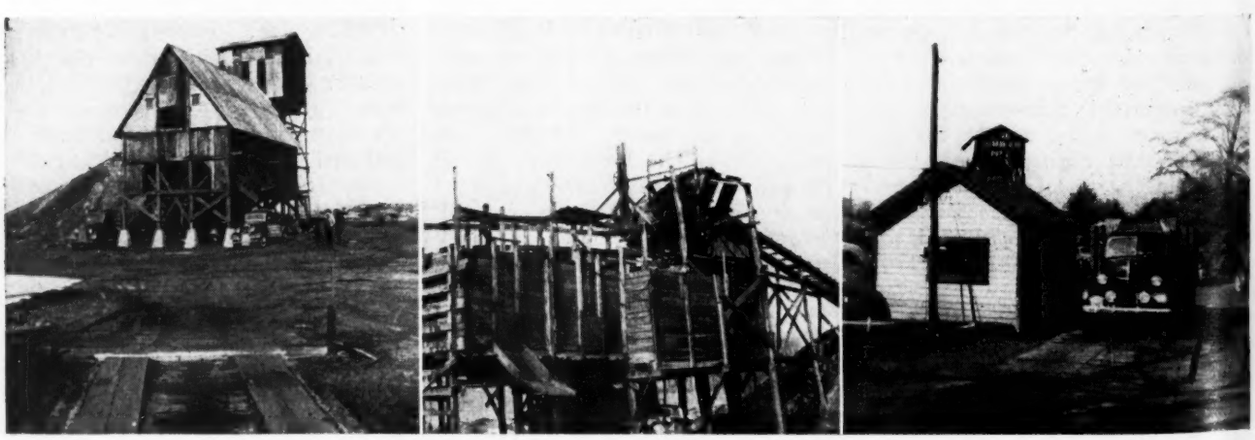
Loading is by hand to date, with mobile loaders being considered by one or two of the larger operations. There are four small electric locomotives in service. Most other mines use ponies, as the majority of the coal is too low for mules.

Ventilation and water handling is accomplished by power-driven fans and pumps. Most of them are operated with electric power. In a few mines, steam or gasoline power is employed. The question of power to drive all this equipment, including the hoist, is a serious one for the tiny operator, who usually starts on a shoestring. First came discarded automobile engines and, for the larger mines, discarded steam engines and boilers. Both are still used. As business grew, the more fortunate and progressive bought diesel engines to drive d.c. generators picked up here and there. One bought a diesel-electric unit from a discarded stripping shovel, and with it ran screens, hoist and cutting machine. Later a new diesel and a used electric locomotive were added.

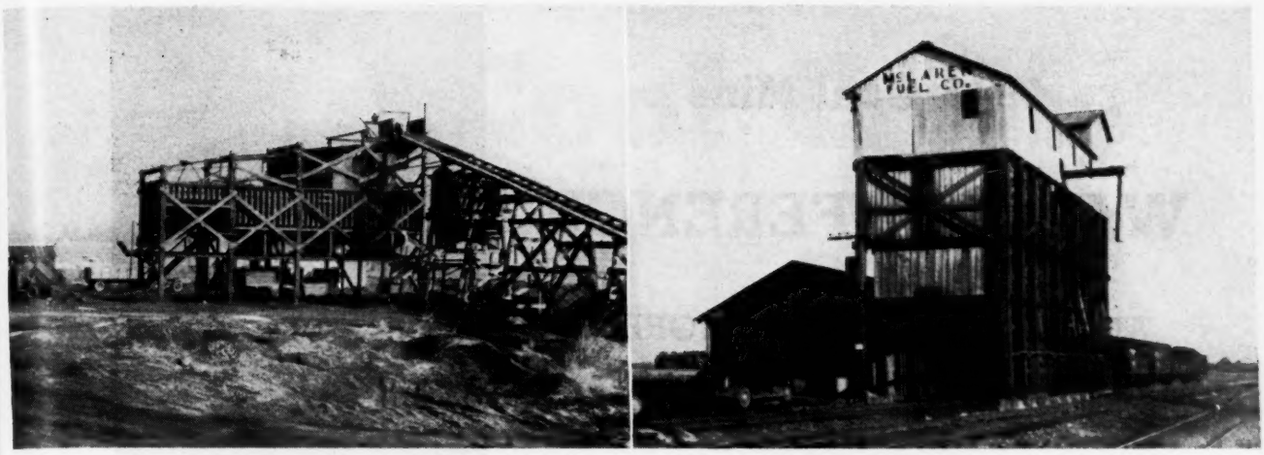
Among these mines are several fairly respectable steam engine-generator equipments. Most of these came from abandoned commercial mines caught in the post-war depression of the 1920s.

Still other operators tried central-station or REA power and are pleased with its convenience and reliability. At present, purchased electric power seems to be growing in favor. Several mines use a.c. power for tipples, fans and pumps, with d.c. power from motor-generators or rotary converters for drilling, cutting and haulage. There is no standard set-up.

The table of power cost herewith is an effort to arrive at a comparison of steam, diesel and electric power cost for these mines. Utility power bills supply the kilowatt-hour portion of electric power. Lack of suitable accounting makes necessary the estimating of supply and labor costs and fixed charges. The figures given are



Left—Combination steel and wood tipple with four bins and eight loading chutes. Center—Low-coal tipple showing universally used automatic car dump. The shaker screens are suspended by chains. Right—Office and weighing facilities of the better class.



Left—Tipple of better-than-average construction. Right—Converting hard-to-move fine coal into commercial sizes for the railroad market is the latest step in successful truck mining.

all based on the same general formula, and serve for comparison.

Safety is stressed more than might be expected. Many of the mines have first-aid training; some 100 percent. First-aid classes are a part of Herrin rescue station's program of safety available to small mines as well as large. A county mine inspector assures some attention to ventilation and general underground conditions.

The market for this coal covers all parts of Egypt (southern Illinois) not directly served by more convenient mines. Arkansas, Kentucky, Missouri and Tennessee are within trucking range. Much of this business is the result of a return haul by trucks coming in with lumber, sand, crushed stone and milling products.

One problem these small mines have been unable to solve until recently is the sale of carbon. Carbon is flexible in dimensions. At most truck mines the bottom dimension of household stoker coal is ¼ in. Perhaps the lack of cleaning facilities prevented educating customers to the use of stoker coal with a 10-mesh bottom size.

For 36 of these mines the McLaren Fuel Co. has solved the carbon sales problem, as well as other sizes up to 2 in. Individual operators deliver these surpluses to the McLaren rescreening plant on a trunk-line railroad. Shaking and vibrating screens size the coal to meet the rail market requirements. In service but a short time, up to 1,000 tons per day is being put through the plant. Facilities will be expanded to handle 2,000 tons if needed.

Because of the expense, accounting in the same detail as prevails at large mines is not possible. Selling is simplified by demanding cash. The checkbook is the basis for dealing with income and costs.

Quality of personnel, equipment and product, on the whole, is on the upgrade. The number of mines is diminishing. As with larger operations, truck mining is a case of the survival of the strong and progressive.

TABLE I—POWER COSTS AT VARIOUS TRUCK OPERATIONS

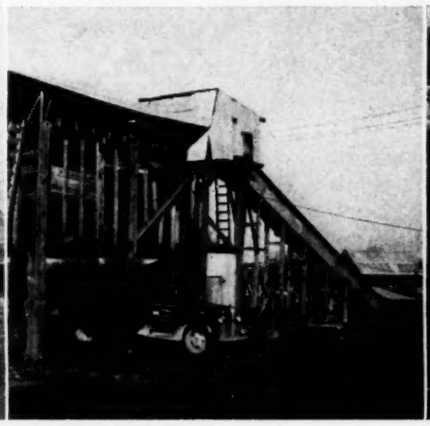
Mine	Tonnage	Type Power	Horsepower of Motors	Power Cost Per Ton: Electric Power	Fuel	Oil	Labor	Reps.	Chgs.	Total
A	63,562	Diesel	....	....	2.5	0.50	1.50	2.50	1.30	8.30
B	42,857	Cent. Sta.	155*	6.59	....	0.17	0.35	0.12	0.28	7.51
C	38,725	Steam	....	....	4.6	0.30	2.00	0.50	0.60	8.00
D	27,520	REA	....	1.00	2.0	0.30	0.55	0.70	0.80	5.35
E	24,730	Steam	....	....	7.7	0.50	2.40	0.50	1.00	12.10
F	†3,500	REA	85	5.71	....	0.18	0.36	0.25	0.53	7.03
G	29,024	Cent. Sta.	*163	5.10	....	0.26	0.52	0.20	0.40	6.48
H	20,000	Cent. Sta.	*150	6.60	....	0.37	0.75	0.20	0.30	8.22

This table of power costs is largely estimated. Coal for steam plants was that reported to the State. Electric power was central-station billing. Most other figures were estimated, using the same formula and are comparative only. Only mine "C" has a good accounting system.

*Includes rotary converter or motor-generator set.

†One month only — September, 1941.

Substation and generator room with 100-kw. m.g. set.



Motor-driven rescreening plant for stoker and carbon fed by a belt conveyor.

Bulldozer feeding coal from stockpile to belt to rescreening plant.

1943 Coal-Mine

WAR CONFERENCE

AMERICAN MINING CONGRESS

MAY 17-18

Netherland-Plaza Hotel, Cincinnati, Ohio

George F. Campbell, Old Ben Coal Corp., general chairman, program committee

Open discussion will follow each paper. All present are invited to participate, ask questions, present problems encountered and cite improvements at their own properties so that the industry may have a comprehensive picture of how these vital mining problems are being solved.

10 A. M. MONDAY, MAY 17

The Manpower Problem in Coal Mining

Fowler V. Harper, deputy chairman, War Manpower Commission, Washington, D. C.

12:30 P.M.—LUNCHEON

The Military Situation

Col. A. Robert Ginsburgh, chief, industrial service division, War Department.

2:30 P. M.—DEEP-MINING SESSION

Reducing Delays in Machine Operation—Equipment Maintenance

A. K. Hert, general manager, Snow Hill Coal Corp., Terre Haute, Ind.

Organizing for Increased Production

J. M. Johnston, vice president, Bell & Zoller Coal & Mining Co., Zeigler, Ill.

Conservation of Labor

C. C. Hagenbuch, chief mining engineer, Hanna Coal Co., St. Clairsville, Ohio

Frank G. Smith, general superintendent, Sunday Creek Coal Co., Nelsonville, Ohio

2:30 P. M.—STRIP-MINING SESSION

Haulage Roads

C. W. Woosley, general superintendent, Pyramid Coal Corp., Pinckneyville, Ill.

Electrical and Mechanical Maintenance

Electrical Controls on Late-Model Shovels

Lester E. Briscoe, electrical engineer, Ayrshire-Patoka Collieries Corp., Oakland City, Ind.

9:30 A. M. TUESDAY, MAY 18

Quality Coal for War and Post-War Markets

E. R. Keeler, president, Franklin County Coal Corp., Chicago

Public Relations for Coal Mining

Frank W. Earnest Jr., president, Anthracite Industries, Inc., New York City

Conservation of Materials

Joseph Pursglove Jr., president, Cornell Coke Co., Morgantown, W. Va.

12:30 P.M.—LUNCHEON

Assisting the Mines to Maintain Full Production

Howard I. Young, director, Mineral Resources Coordinating Division, WPB

Machinery and Equipment for Coal Mining

A. S. Knoizen, director, Mining Equipment Division, WPB

2 P.M.—MANUFACTURERS' MEETING

Joint conference, manufacturers and Mining Equipment Division, WPB

2:30 P.M.—DEEP-MINING SESSION

Removing Seam Impurities Underground

John J. Snure, assistant production manager, Rochester & Pittsburgh Coal Co., Indiana, Pa.

Safety in War Time Mining

E. R. Price, general superintendent, Inland Steel Co., Wheelwright, Ky.

Coal-Dust Control Underground

R. H. Honaker, safety director, Guyan Eagle Coal Co., Amherstdale, W. Va.

2:30 P.M.—STRIP-MINING SESSION

Moving Overburden With Small Draglines

Harrison Eiteljorg, general manager, Morgan Coal Co., Indianapolis, Ind.

Moving Overburden With Large Draglines

T. H. Latimer, engineer, United Electric Coal Cos., Chicago, Ill.

TUESDAY EVENING—ANNUAL DINNER

The Coal Crisis

Real Issue: **POLITICS**

THE COAL STOPPAGE brought us to the brink of a national crisis greater than "a crippling defeat" on the battlefield. Now the peril of a prolonged shutdown seems momentarily to have been averted. But the inherent menace which the crisis revealed will remain to threaten us with national disaster anew—unless we can dig it out to its very roots.

Before it is too late, we must probe more earnestly and soberly than ever before into the fundamental origin of the crisis. For there must be some deep-seated, serious cause which would induce in a segment of people, numbering only about half a million, a state of mind where they would—wittingly or unwittingly—endanger a nation of 135 million.

It is fitting to ask, therefore: How could this have happened? We must try to ascertain how we arrived at an impasse so fraught with danger to our way of life. Then, perhaps, we can retrace our steps and avoid henceforth such threats to our national security.

First, does the fact that such a crisis could occur signify that we have failed, over the years, in our efforts to determine a fair day's wage? Hardly. If the basic issue were dollars and cents, then we could have used time-tested procedures to establish the facts and reach a solution satisfactory to all, including a justice-loving public. No, despite surface appearances, money was not the real issue.

Was the crisis, then, the result of misplaced faith in collective bargaining? Again, no. Surely the settlement of differences around the conference table has served too long and too well to prove suddenly a delusion.

Did the real issue, then, hinge on the sudden discovery that a miner's pay should begin and end at the portal? Again, hardly. It has been a matter of long-standing agreement that the miner's time begins at the face. If this issue, and other technical questions newly raised, were of major importance, then surely they would have been seriously discussed in previous negotiations.

NO, the route that brought us face to face with industrial chaos is a strange, uncharted one —to both employers and employees.

It is the route of **politics.**

In other years, employers and employees knew how to determine a fair wage, how to use the machinery of collective bargaining, and how to resolve technical problems. This time, however, we are witnessing no ordinary disagreement between honest men stubbornly disputing honest issues.

What we are witnessing, instead, is a test to determine whether in a democracy, we can, for years, play politics with the dynamite of class hatred and still maintain national unity in a crisis.

Let us retrace our steps. In the early 1930's, labor began to lean on government. Labor began to finance political campaigns with the inescapable understanding, on labor's part at least, that favors would be granted in return. Thus labor turned away from the principles of true collective bargaining on an economic, factual basis. Thus began the practice of pitting class against class and section against section. Even then one might have asked: How long could such an alliance endure? By its very nature—and this should have been obvious at the time—it could last only as long as labor continued to receive what it demanded. When government was finally forced to say "No," the alliance inevitably had to collapse. For the labor leader was left with nothing to offer the followers whom he had taught to expect so much.

Old Sam Gompers, had he been alive, could have offered some very pertinent advice on the hazards of such an alliance. But the die was cast; the seeds of eventual disruption were sown.

So, for weeks in the 1943 negotiations, the conferences continued while everybody knew that the real issues were not on the table. Everybody knew that it was not a battle over two dollars, over the measurement of the miner's day, or over any of the other technical matters brought up in the miners' demands.

Instead it was a battle for the thing our oriental enemies call "face."

It is no secret that if a face-saving formula could have been found before the negotiations broke down, the true gravity of the crisis might never have come to the surface.

But why should it have been necessary to save anybody's face? Simply because the attempt to put labor relations on a new and strange basis made it possible for one union leader to vault to such a position of power that he could, and did, dare to demand that the preservation of his personal prestige be made the first consideration in the solution of a national crisis. Because it made it easy for labor leaders, with the backing of the government, to capitalize on class conflicts. In such an atmosphere, it was easy for the miner to believe things that the facts prove to be false —that his income has failed to keep pace with the cost of living, that he could get nothing but a raw deal from the War Labor Board, that company stores and company towns are operated always to his disadvantage, that he is being penalized in the way his working day is determined, and others.

WHAT IS THE SOLUTION? A temporary solution may be in the making. But the final solution can lie only in correcting a serious error in our national thinking: namely, that employer and worker are natural enemies, that the struggle between them must go on and on until one or the other gets the upper hand.

Americans must be led to understand that management and labor are natural partners, not enemies, and that neither can prosper when the other fails. How, then, can Americans be brought to the conviction that there is a natural partnership between management and labor? Only by education—by patience, cooperation, and explanation. The problem is national. But its solution is not. It is the individual task of every management in every community. It must be advanced with sincerity and buttressed by proof. It must not be undertaken in a spirit of vengeance, nor with petty, short-range objectives.

Only thus can we hope to maintain our solemn pledge: "one nation indivisible, with liberty and justice for all."

Only thus can we be sure that never again can one man acquire the power, through politics, to hold a pistol at the head of government while our nation is in a war for survival.

The FACTS About the Crisis

★ Now that coal mines are operating under government control, at least for the period of the 15-day truce, the spotlight again swings to the claims put forth in support of the miners' demands. Coal Age herewith presents the facts concerning the major issues

About the Operators' Counter Proposals

The assertion that the operators refused to offer a counter proposal was used heavily against them. By implication, the impression was thus given the general public that the operators spurned the obligations of true collective bargaining. Actually, the operators had no choice. The President had just issued his "hold the line" order, with the clear intent to stabilize prices and wages at existing levels within the framework of the "Little Steel" formula.

Had the operators made a counter proposal involving any increase in wage rates or cost of coal to the consumer they would have been flying in the face of the President's own instructions to the nation and acting against the national interest.

The only possible counter proposals which the operators could make were made. On March 12, the southern operators moved that existing master and district contracts be continued until the end of the war. On April 6, the Northern Appalachian operators likewise proposed that "The presently existing wage agreement should be continued for the duration of the war, subject to such changes as may be required by governmental policy or by standards fixed by the government or the economic stabilization of the industry."

The operators in effect did make a counter proposal. It was: To support the President of the United States in his "hold the line" order.

About Miners' Wages and Cost of Living

It has persistently been asserted that living costs have risen faster than miners' wages. Few ideas have had as much selling pressure put behind them. And, it may be said that this selling has produced results —both in the minds of the miners and the public.

The fact is, miners' wages have more than kept pace with living costs, as shown by the statistics of the Department of Labor. Here is the record:

	1940	*1941*	*1942*	*1943*
Annual earnings, bituminous	$1,235	$1,452	$1,769	.....
Index (1940 as 100)	100.0	117.6	143.2	.....
Annual earnings, anthracite	$1,262	$1,425	$1,699	.....
Index (1940 as 100)	100.0	112.9	134.6	.....

	1st Quarter, 1940	*Jan., 1941*	*Jan., 1942*	*Jan., 1943*
Cost of living index (1935-39 as 100)	99.8	100.8	112.0	120.6

These figures show that the annual income of the bituminous miners increased 43 percent and the annual income of anthracite miners 34 percent since 1940, in which period the cost of living increased less than 21 percent! It seems logical, therefore, that if the scales of wages in previous years (assented to by the miners in signed contracts) were satisfactory from the cost-of-living standpoint they could well be considered satisfactory now, since they permit increases in earnings far greater than the rise in cost of living.

We are not here debating, however, whether coal miners' wage rates should be more or less, although the record shows that they are among the highest paid by any industry. Rather we are offering permissible discussion on a point already made much of by the miners' representatives. In that connection, the fact remains that the miners already have received more than the increase permissible under the "Little Steel" formula, and the record shows that their income has risen faster than the cost of living.

About Prices in Company Stores

Some of labor's professional "friends" would have it understood that miners are charged exorbitant prices for goods purchased in company stores. Not commonly heard in late years, this rumor, however, was revived in the press as recently as May 1.

To begin with, only a little more than half of the nation's miners are employed by companies owning stores. And, with exceptions so few as to be negligible, the stores in operation are well stocked, well run and conducted with an eye to the customer's benefit. This is a matter both of good management and good business.

Second, miners are not compelled, either by company rule or by force of circumstance, to trade in company stores. On the contrary, such stores must compete with the private merchants whose wares have become increasingly available to the most isolated of miners as transportation facilities improved.

Third, company stores are subject to the same OPA supervision as private stores. And more. For company stores are thoroughly policed by local union officials, quick to investigate any grievance arising therefrom.

Fourth, even supposing that an employer might be disposed to boost prices unnecessarily, the fact remains that without men—good men—he cannot operate, and therefore it is to his interest to do nothing to estrange his working force, especially now, when manpower is so critical.

Some abuses may have existed in the past and there may be isolated instances today. But anyone who asserts as a glib generality that company stores are taking advantage of miners is simply careless, malicious, or both. Such statements, furthermore, do nothing to check the growth of class hatred—a major factor in the present crisis.

About Portal-to-Portal Payment

Regardless of what else might be said, one fact stands out in this connection: the head of the legal department of the United Mine Workers joined with operators July 9, 1940, in requesting that the Wage and Hour Division of the Department of Labor rule that the miner's working day begins and ends at the face and not at the portal. This request, in which,' as stated, U.M.W. counsel joined, made the definite statement that it was the only practicable way of determining working time and wages if coal mining were established on that basis. There is no reason to believe that conditions in coal mining have changed to any considerable extent since that time.

About Guaranteed Work

When, late in 1942, interested government agencies asked that the work week be lengthened to six days, the union leadership insisted that the sixth day be made permissive in the bituminous industry. Thus a miner could not be penalized for absence if he chose not to work the sixth day.

Now it appears that employers may be compelled to guarantee six full days of work each week, whether they can provide it or not. This has been accepted by Mr. Lewis, who sees in such an arrangement an "equity" for miners amounting to $2.25 a day.

But, while the sixth day was made permissive for the miner, it seems that so much choice will be available to the operator. Developments make it logical to conclude that if operators cannot provide work, they will have to pay miners for not working.

It is hard to estimate what this eventually may mean in cost to the nation, if adopted. First, it projects a new element—entirely new—into relations between employers and employees, not only in coal mining but in other industries. It is certain that the miners will construe it as establishing a precedent for future operations when government control ends.

In the years to come, therefore, employers may find themselves paying miners for not working as much as 100 to 180 days a year—unless the normal buying habits of consumers can be radically changed.

Finally, if the miners' union succeeds in obtaining this guarantee, other unions doubtless will demand it in other industries. And with the same result.

TESTED METHODS

for

INCREASING TONNAGE

Proper Crew Size • Adequate Working Places
Wider Working Faces • Deeper Machine Cuts
Improved Transportation • Short Car Change
Balanced Operation • Efficient Maintenance
Right Supply Service • Good Power at Face
Safe and Efficient Working Conditions

Production Methods to Meet War-Tim

TONNAGE again is the battle cry in coal mining—preferably low-cost tonnage.

Individual productivity, or the quantity of coal a man gets out in a shift, is a critical factor from both standpoints. It is critical because the lower the individual productivity the lower is the total output of a given machine or a given mine, and in turn the output of the industry. And it is critical in cost because the more labor per ton shipped the more the money outlay.

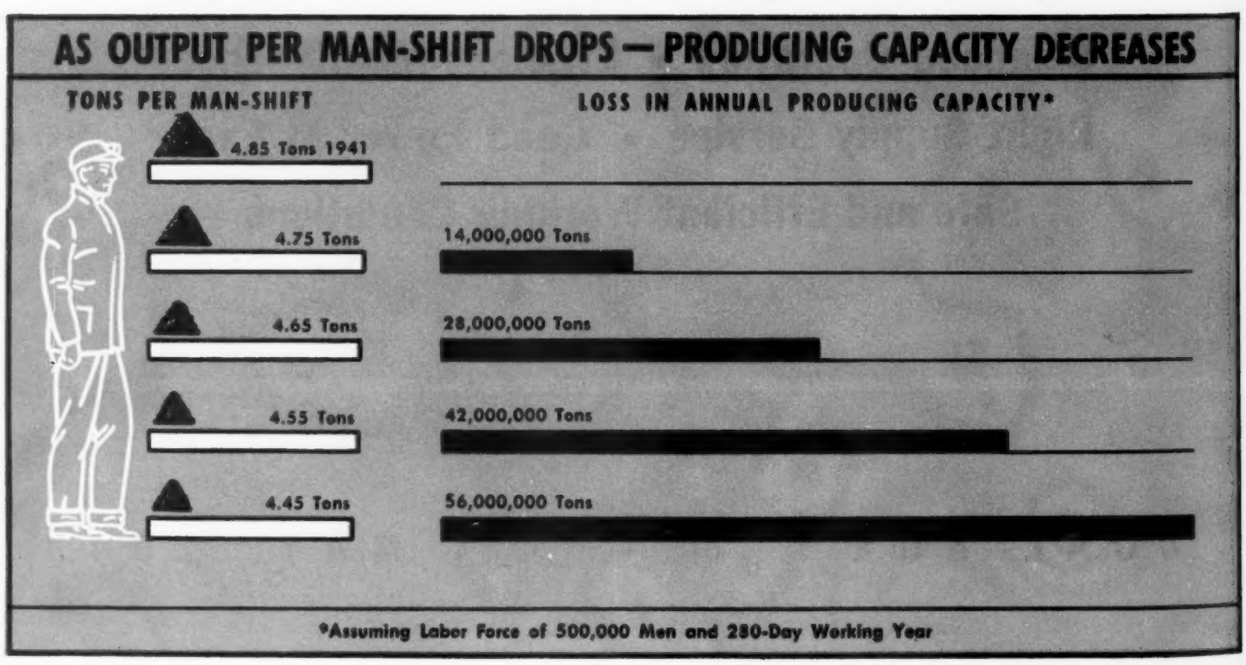
How can individual productivity be raised? One way is to install mechanical-mining equipment. That it pays is evidenced by the fact that the industry now is well on its way toward producing the majority of its tonnage in this fashion. But there are ways of increasing individual productivity with little or no outlays of cash. These involve merely the application to the hilt of well-known and tested principles.

Why the concern over individual productivity now more than any other time? Strong evidence indicates that if industry-wide output per man-shift has not already begun to suffer as a result of war repercussions it will soon do so unless offsetting measures are taken. The reasons are several, including a higher proportion of older men and green hands taken on to replace those leaving for the services or other industries.

Even a minor drop in individual productivity could mean a substantial decrease in capacity to produce. If it were 5 percent, which some companies already have experienced, the decline in daily output per man, anthracite and bituminous combined, would be in the neighborhood of 400 lb., or 0.2 ton. Assuming an average working force of 500,000 men, which might be less before the year is over, and 280 days of operation, the annual loss in producing capacity would be 28,000,000 tons. If the drop in productivity were higher, the loss would be correspondingly greater. In the case of an individual company normally employing 150 men, a drop of 0.2 ton per man shift, on a 280-day basis, would mean a loss of 8,400 tons.

Perhaps measures now under consideration or already adopted, such as the longer work week, may prevent a drop in productivity, as well as losses in manpower, from unduly decreasing capacity to produce. However, there is no means of offsetting the effect of lower individual productivity on the cost of coal, especially where wages are paid on a daily or hourly basis. A simple example of what might happen in a day-wage mine will illustrate the point. If the mine, fully mechanized, normally produced 1,500 tons with 150 men, it might be assumed that the daily wage bill would be $1,050, making the labor cost 70c. per ton. If individual productivity were to drop 0.2 ton per shift, the wage bill still would be $1,050, whereas the output would be 1,430 tons, thus increasing labor cost to 73.43c. If for no other reason, individual productivity should be jealously preserved and, if possible, increased. Capacity to produce is safeguarded and the industry's ability to earn a profit and continued good wages is preserved.

Accepting the fact that increased individual productivity is highly desirable any time, and especially so in the present emergency, the question is: "How?" Machinery, and particularly mechanical coal-loading



Coal Demands

and handling equipment, is perhaps the major answer. The most efficient use of this equipment—and all other producing facilities—is the second answer, perhaps scarcely less important. This involves, among other things, providing men of the proper caliber as far as possible and in sufficient numbers to get the most out of the equipment and facilities, and eliminating all other factors or conditions which might make it more difficult for the equipment or the men to function with maximum efficiency.

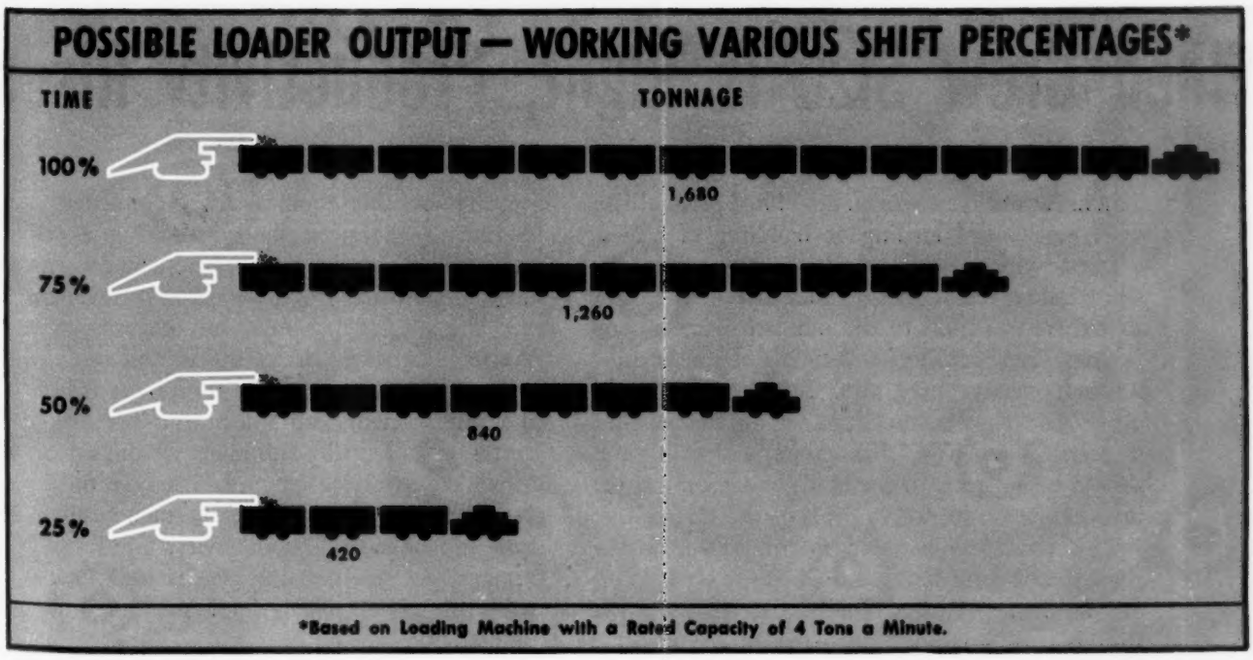
What could a mechanical-loading unit do if it were able to work at its rated capacity? Take a unit built around a loading machine rated at 4 tons a minute. If it worked at loading continuously for seven hours, or 420 minutes, it could produce 1,680 tons. Even if it worked only 25 percent of the available time, it could produce 420 tons a shift.

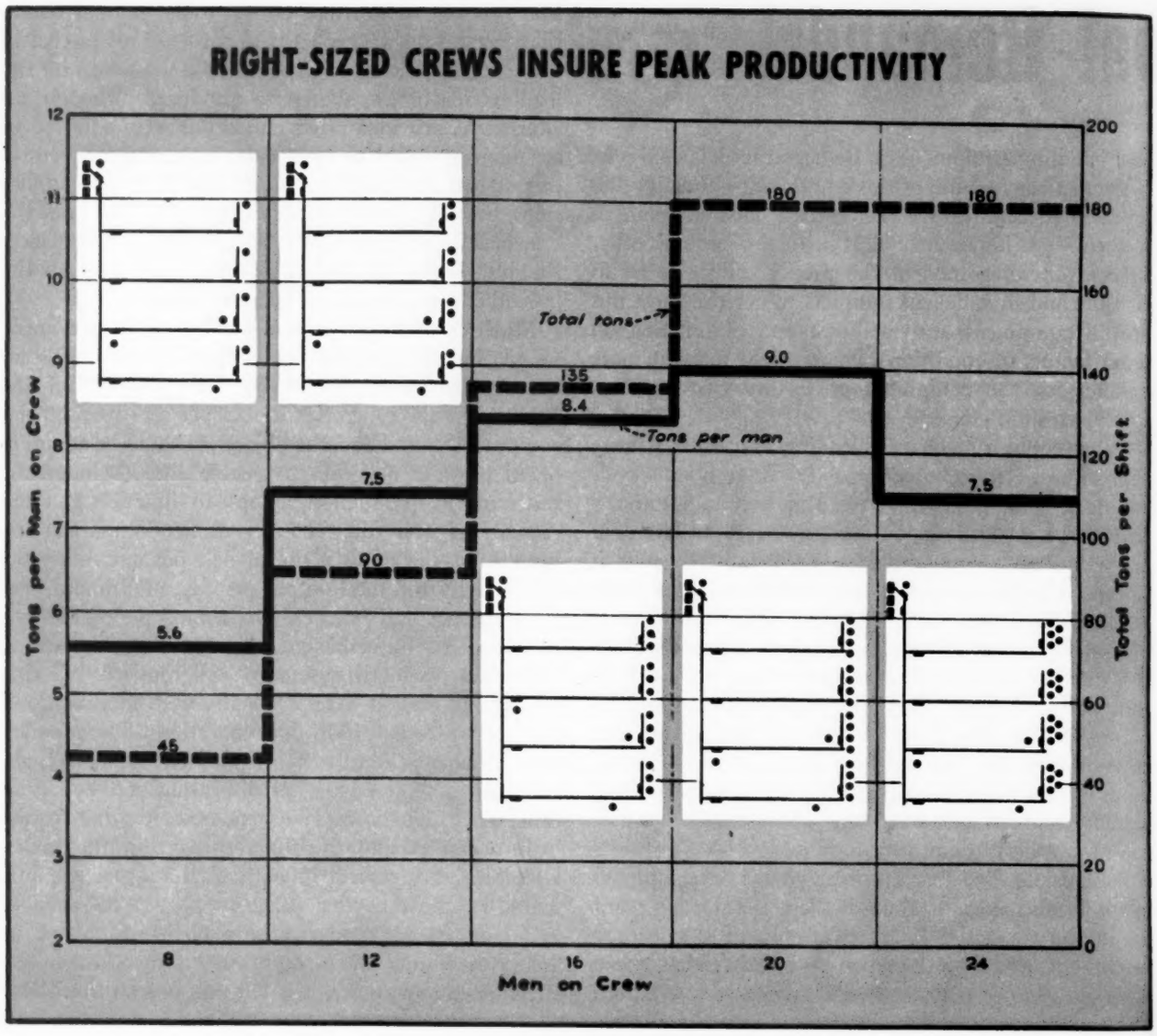
Startling is the word for such figures, especially since the number of loading machines averaging over 400 tons per shift is not large in proportion to the total in service. Why don't mechanical-loading units produce at such rates? One reason, of course, is that under the usual mining conditions it is difficult to keep to rated capacity and, second, to arrange things so that a unit can always be loading.

Perhaps emphasis has not been placed on the proper factor in mechanical loading. Perhaps the starting point should be the rated average capacity of the loading machine, duckbill or face conveyor rather than some other measure of performance, although it is admitted that this brings other limiting factors into the picture. For example, a shortwall cutter, under normal conditions, would not be expected to cut 840 tons of coal in a shift. Thus, its capacity would be a limitation on the loading machine's ability to produce, although an alternative, provided other conditions were adjusted in accordance, would be to install a higher-capacity cutter or put two shortwalls to work. The latter and similar steps, however, would mean more men. This is not the drawback in all cases that it would seem at first glance, the test being whether additional men increase the individual productivity of the crew membership.

Much more might be said on the points previously raised, but the problem boils down to the fact that the starting point should be rated capacity of the loading machine, conveyor, scraper or other major equipment unit. Then, the objective should be adoption of all possible measures to enable the machine—the heart of the production set-up—to function at rated capacity as near full time as possible. When this has been done, the result is the highest possible individual productivity and total output per day, month and year.

Experience and research over a long period of years have evolved numerous tested methods of increasing individual productivity and over-all tonnage. All that needs to be done is to apply them—with modifications, if necessary, to suit individual conditions. Some require substantial expenditures for equipment and materials, and this may offer practical difficulties at the present time. There remain many others, however, that require little or no expenditure for very worth-while results. Examples of measures in both classifications are presented in the following pages in this special section, with accent on those requiring no great outlays of money or much new equipment. Others might be offered, but experience, it is felt, has proved that those discussed are the most important.





When Crew Size Is Right, Productivity Rises

THE EFFECT of crew size on individual productivity with mechanical loading or handling of coal is a factor which apparently has not received the study it deserves. It goes without saying, of course, that there is a limit to the number of men composing a crew, as the familiar law of diminishing returns operates here also. But, assuming that other conditions are no bar to reaping the benefits, it seems reasonable that crews and territories should be enlarged to the point where output per man employed begins to dip.

This point is illustrated in the accompanying chart, based on a four-room conveyor unit. With one faceman per place, the output per place per shift is correspondingly low, less of the possible capacity of the equipment is employed and, because of the necessity for carrying a certain number of men for auxiliary operations which must be performed regardless of how much coal is run, the output per man on the crew is low. As more men are added, the output per face is built up, the capacity of the equipment is utilized to a fuller extent, and the output per man-shift increases until finally the point is reached where no work is available for an added man on a face crew. Beyond this point, extra men result in a drop in individual productivity. Study of the proper crew size certainly seems indicated as a major means of raising individual and over-all productivity.

Sufficient Working Places Insure Efficiency

COAL SUPPLY has a major bearing on both the total production of a mechanical loading or handling unit and also on the individual productivity of the men on the crew. The problem is divided into two parts:

1. Total supply made available in a shift.
2. Total in any one working place.

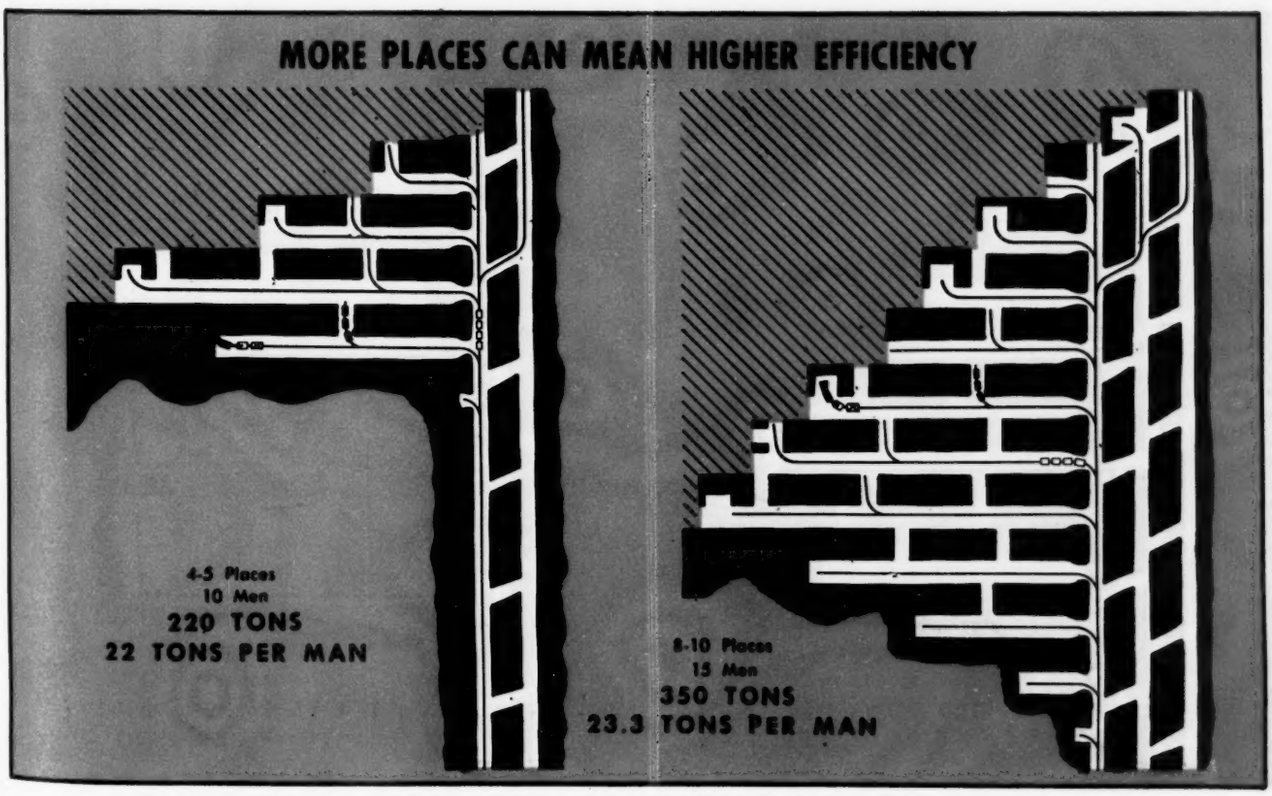
Total coal supply normally is the aggregate tonnage provided by the working places if cut once a shift or, if a smaller number of places is provided, this number times the number of cuts that can be made in a shift. With a continuous cycle, which is contingent upon ability to shoot on the working shift, it is, of course, entirely possible to take two or three cuts out of a place and thus reduce the number of working places.

Where conveyors are employed, a continuous cycle is a necessity, as otherwise the investment in facilities per ton of output (in room-and-pillar and similar mining) is unduly increased. Where mobile loaders served by mine cars are used, however, quite a few operators, at least in the past, have felt that four or five places with a crew of eight to ten men constitute an efficient set-up under continuous-cycle operation. Under some conditions, they may be right, but the test these days at least should be total output per unit in relation to output per man employed on the crew.

Even if there is no appreciable increase in productivity, more places in a working section may mean better utilization of equipment, assuming the extra men are available to put on the crews. However, as already pointed out, indefinite increase in crew size is not a paying step. The goal should be a proper balance between crew size and places per territory so that both individual productivity and total output per unit will match at the most efficient point.

Operating with a small number of working places introduces a large element of chance in that trouble or interference between machines and men can cost a considerable tonnage on occasions and reduce the average over a period of time. As an example, a territory might consist of four to five places, continuous cycle. Because this number of places would not permit great spreading out, crew size necessarily would be small and certain members would perform several different operations. Even with close scheduling and careful supervision, interference might frequently occur. Consequently, the average unit output might be 220 tons. With a crew of ten, individual productivity would be 22 tons.

On the other hand, if the territory were planned



to provide at least eight places at all times, an ample number still would be left for operation even if one or two should be temporarily blocked out by falls or other troubles. Neither would it be necessary to carry on two operations, such as drilling and timbering, simultaneously in the same working place. Thus the chances of loss of time resulting from waiting or interference would be eliminated. Scheduling of operations in the cycle would be greatly simplified and a hitch in one place ordinarily would not delay everything behind it. Consequently, unit output might increase to 350 tons, and with a crew of 15 men the individual productivity would be 23.3 tons per man.

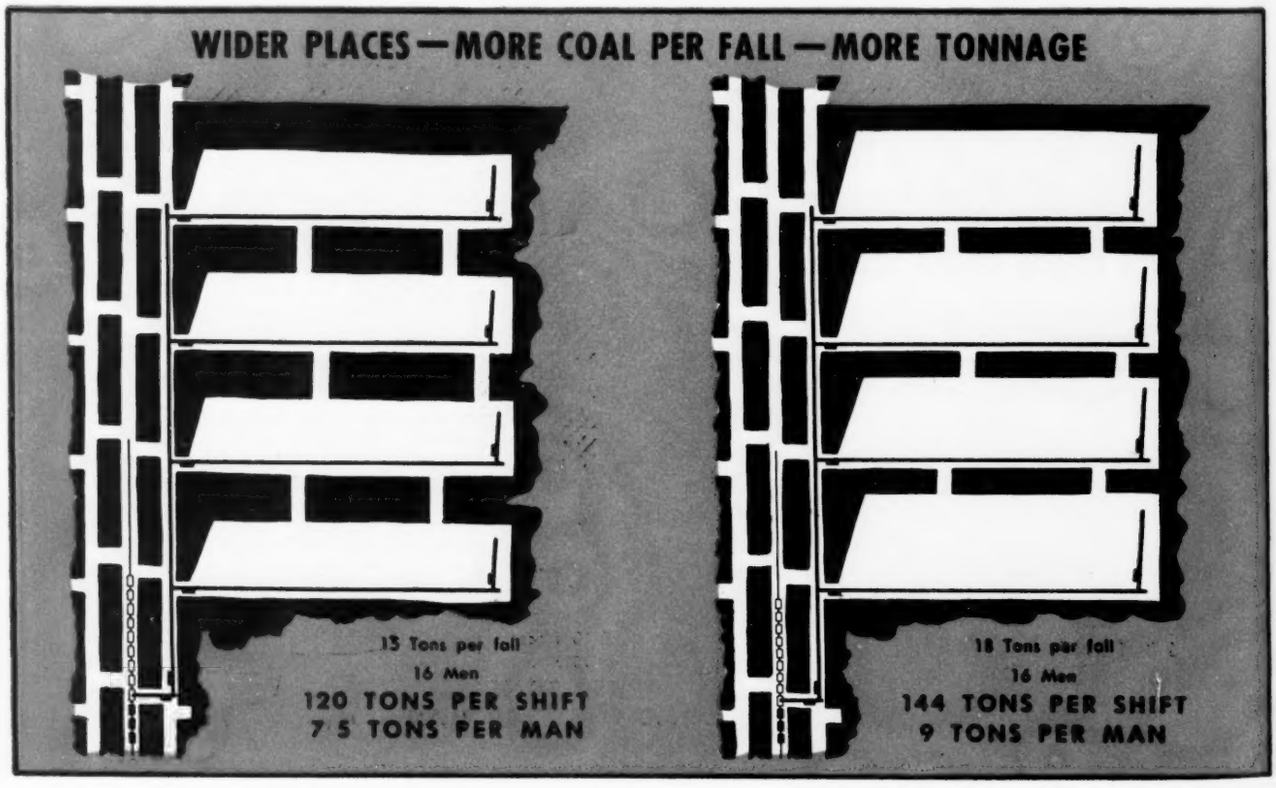
Operation of development units should be given special attention from the standpoint of possibly increasing efficiency by raising the supply of coal per shift. Working a loading machine and auxiliary equipment in entries made up of two headings and either letting it lie idle part of the time or moving it long distances to other entries makes it difficult to get the output and efficiency which the heavy investment certainly warrants.

True, a great increase in number of headings might reduce the footage of entry that could be driven in a given period of time and thus cramp development. However, increased tonnage from entry work would at least partially offset the footage decrease. It seems evident, therefore, that driving at least three and possibly four or more headings per entry, especially when mobile loaders are employed, should result in a substantial increase in individual productivity and possibly in over-all mine tonnage.

It is granted that merely increasing the number of working places and total men on the crew will not always result in an increase in efficiency, but, if it has not already been done, investigation of the question of balance between coal supply and crew size certainly is indicated.

Wider Places Provide More Productive Time

THE QUANTITY of coal available in a single working place is, as stated, a factor in efficiency. Consideration of only the single question of moving will prove the point. When a mobile loader is traveling it can't be loading. Therefore, the goal should be maximum tonnage per fall to reduce the number of moves. The same applies to other equipment, although with conveyors and scrapers there



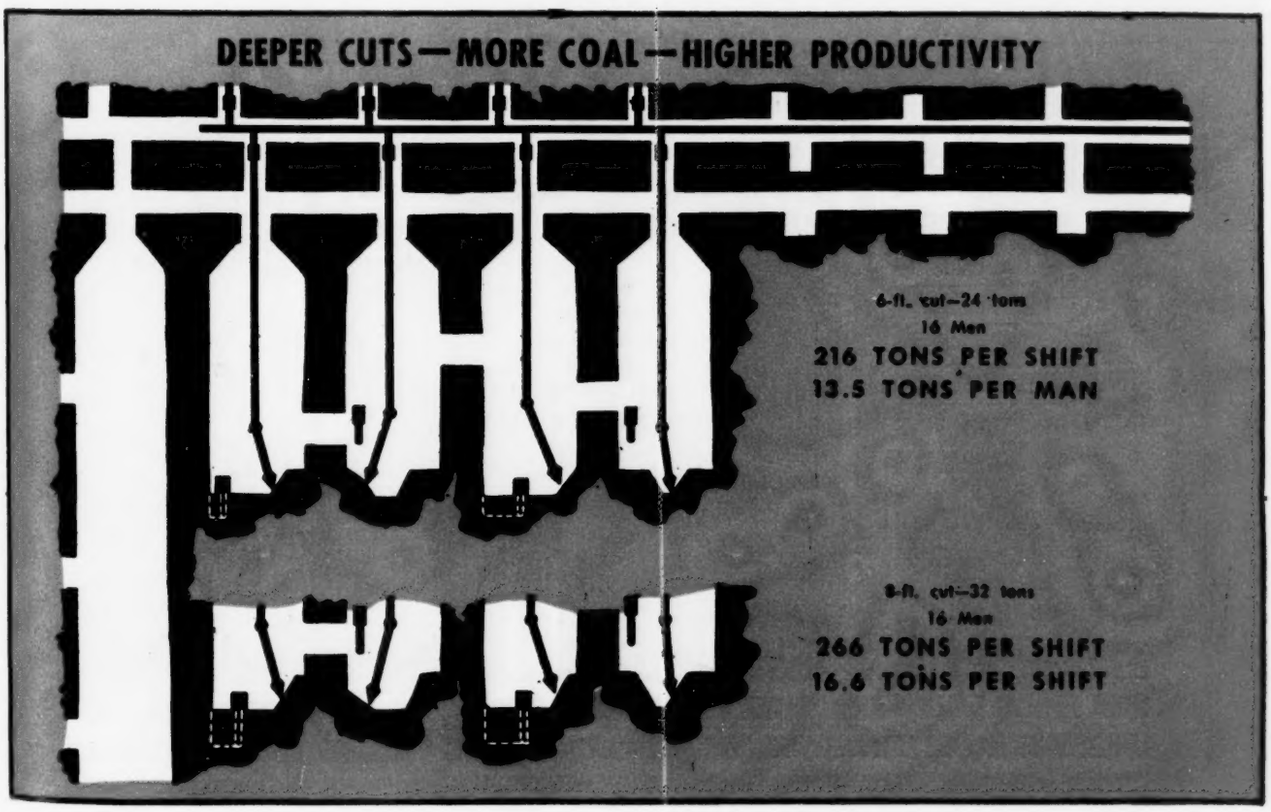
is a little more opportunity for using the moving period for doing other necessary work. However, it is reasonable to conclude that the less often the cycle of cutting, drilling, shooting, conveyor extension, scraper moving, etc., must be performed the more opportunity there is for carrying on the major activity: loading.

Increasing the width of place is one means of building up the tonnage of coal which can be handled between moves. It is granted that this is not always feasible or safe, but neither should the possibility be neglected. Roof conditions, for one, may make widening places impossible; likewise the reach of the loader, etc. But if it can be done safely, widening the working place will almost certainly increase efficiency. The theoretical ultimate, of course, is a single working place which would permit the loader or other coal-handling equipment to operate continuously at capacity.

A four-room conveyor unit might be selected to show the possibilities. With places making 15 tons per fall and a crew of 16 men, the total daily tonnage might be 120. Individual productivity would be 7.5 tons per man. If conditions permitted increasing the width of the place so that a fall made 18 tons, the decreased time spent in auxiliary activities might still permit the same crew to complete the same number of cuts. Total production then would be 144 tons and individual productivity 9 tons. The same principles apply regardless of the type of equipment employed. In other words, the less time devoted to moving and other nonproductive auxiliary activities, the more there is for loading, with consequent increase in efficiency.

Deeper Cuts Raise Tonnage and Productivity

If widening working places is impracticable, there still remains the possibility of a substantial increase in tonnage per fall through deepening the cut. Seldom is this impossible, although it naturally involves a longer cutter bar. Depending upon the type of machine and natural conditions, equipping an existing machine with a longer bar may be impossible. In this case, a new machine is necessary. However, many existing machines have sufficient motor power to carry a longer bar, especially if heat-resisting coils are installed and other changes are made to permit the unit to operate at or slightly over rated horsepower, if necessary. Good voltage at the face will help materially.



A longer bar on an existing machine generally offers no insurmountable difficulties even these days, and it ordinarily is possible to take care of the necessary modifications in drilling and shooting practices, if any are required. The benefits may be substantial. With a four-room conveyor outfit using automatic duckbills, as an example, the yield with a 6-ft. cut might be 216 tons per shift. With a 16-man crew, individual output is 13.5 tons.

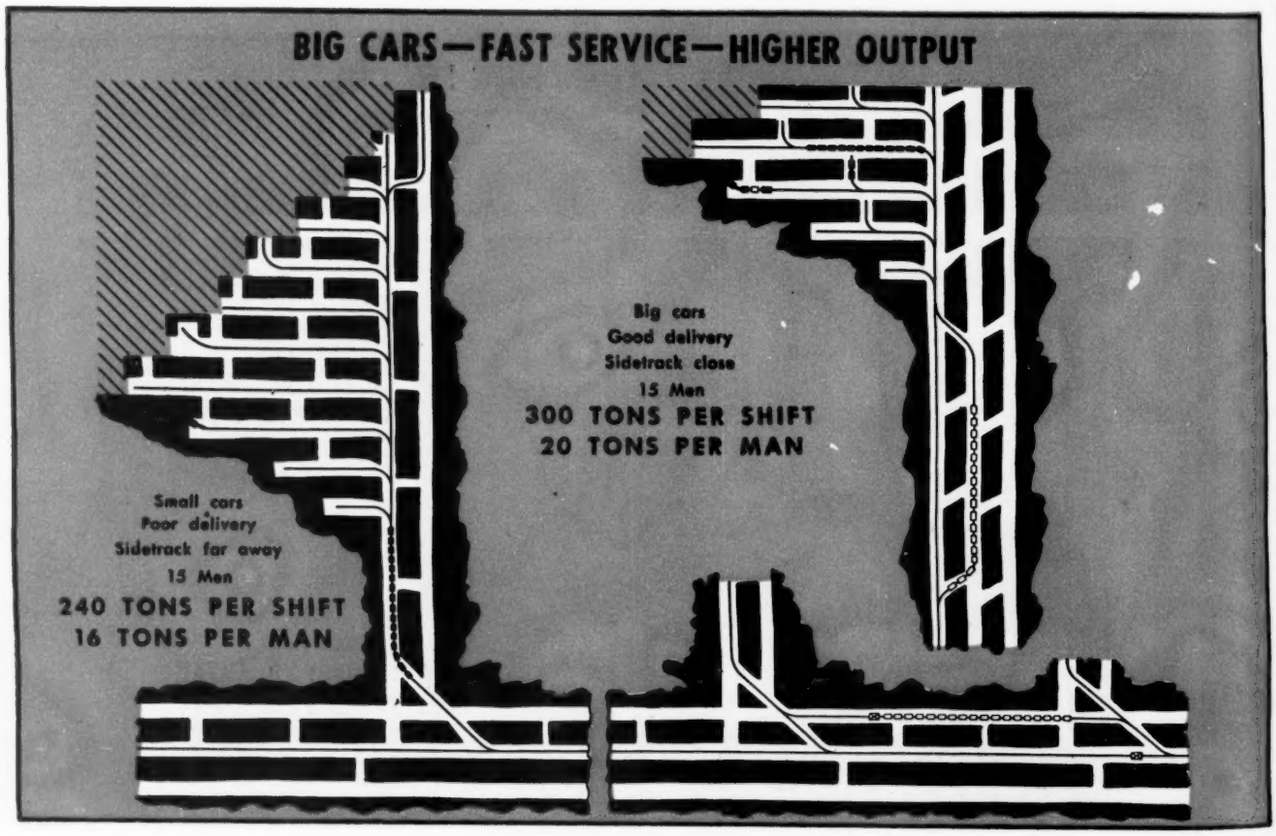
With an 8-ft. cut, the time required for making such a cut should be no more than for 6 ft., and the same should hold true for drilling, shooting, extending the conveyor, etc. Thus, in proportion, the yield of coal per unit of non-productive time should be greater, even though a crew might not be able to get quite the same number of falls as before. But assuming that the increased loading time made available permitted production per unit to be raised to 266 tons with the same 16-man crew, individual productivity would rise to 16.6 tons. The same considerations would apply with other types of equipment, including mobile loaders.

Big Cars and Good Service Boost Efficiency

Conveyors, because they operate continuously, theoretically are the most efficient transportation medium behind mobile loaders. But various practical considerations, such as moving time, the necessity for a continuous cycle and a small number of working places if investment is to be kept down, etc., make it difficult for conveyors to compete with good mine-car or shuttle-car systems. However, the word "good" should be stressed. Among some of the features of a good mine-car set-up are:

1. Big cars—the biggest possible.
2. Delivery of the cars to the working section as needed, meaning good main-line and secondary haulage systems.
3. A short car change.

Other refinements might be added, such as two changing locomotives where conditions permit their use, provided the extra locomotives are available. To get the most out of two-locomotive changing, however, it is necessary to connect the tracks in adjacent working places through the crosscuts, which is difficult or impossible in most pillar-mining plans. Use of shuttle cars, if they can be acquired and other conditions do not for-



bid their use, permit two changing units to a loading machine even in pillar mining. And since shuttle cars normally replace much smaller mine cars, they also accomplish one of the major objectives in service to loaders.

The big car, which includes the transfer car being increasingly applied at mines where shaft size forbids bringing large cars to the surface, improves efficiency by permitting the loader to work longer between changes, meaning that the proportion of changing time to loading time is reduced. If it were assumed, as an example, that a cut made 30 tons, or enough to load ten 3-ton cars, and if the round-trip changing distance was 300 ft., changing time (3½-m.p.h. approximate average speed, including stops) would be 1 minute. Total changing time per cut, assuming no change for the last car, would be 9 minutes.

If a 6-ton car were substituted, total changing time for a cut would be 4 minutes, as it normally requires no more time to change a big car than a small one. The saving therefore would be 5 minutes per cut. If the average loading rate was 2 tons per minute, the time saved would be sufficient to load, say, 8 tons in another place with allowance for moving into this other place. Other figures may be substituted or the solution may be worked out on the basis of average changing distance over the life of the place, etc., but the fact remains that big cars can save enough time to permit a major increase in tonnage with a corresponding rise in individual productivity.

But even big cars are no help if they are not around when they are needed. Consequently, main-line and secondary haulage must be adjusted so that the service locomotive is never out of empties and so that it need not go over a few hundred feet (preferably not farther than the next place, if possible) to get a new supply. The fact that a machine with a capacity of up to 6 tons or more a minute, and possibly a good part of a crew of 10 to 18 men, more or less, will be standing idle should never be overlooked in laying out a haulage system. This also is true of conveyor layouts, especially a layout served by a mother belt.

Where mobile loaders are employed, the goal normally should be delivery of cars not farther away than a sidetrack at the mouth of the room entry. Preferably, they should be delivered to an adjacent working place or to a sidetrack in the room entry. Also, they should be delivered when or before needed.

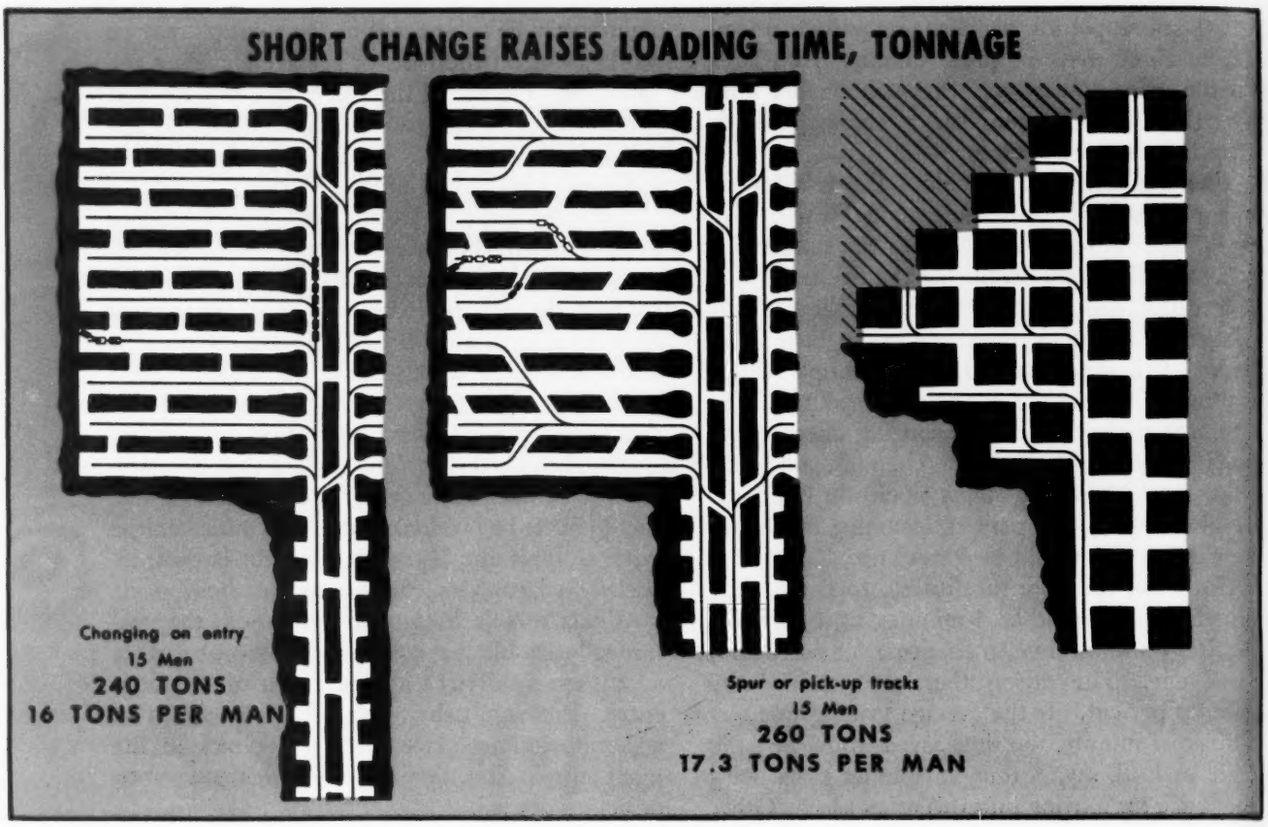
Short Change Raises Available Loading Time

GALLONS of brain sweat have been poured out on the various phases of improving the efficiency of mechanical loading. Yet, aside from size of car, the short change still remains one of the better methods of increasing unit tonnage and individual productivity. It all goes back to the fact that when a car isn't under the rear conveyor the machine can't load. So the idea is to keep a car there as long as possible.

Dragging a car from the face of a 300-ft.-deep room to the entry and switching there manifestly is a waste of good productive time if an arrangement can be made to switch closer to the face. Two popular methods of accomplishing this objective are: spur tracks into every or every other crosscut and, second, pick-up systems whereby tracks in adjoining rooms are picked up from the center, or "key," place every or every other crosscut, midway of the full depth, etc. True, pick-up and spur tracks require extra switchlaying and other track work, but the time can be materially reduced by employing steel-tie or prefabricated turnouts. Even if these should not be employed, the test remains whether the extra switches—and perhaps extra labor—will raise the individual productivity of the men on the crew by raising unit output. If they do, they are quite likely to be a paying step.

One way of figuring the benefits might be on the basis of the average changing distance over the life of the place. If the place made 50 cuts, each cut yielding 30 tons, and the maximum depth of place was 300 ft., changing on the entry would mean an average one-way distance of 150 ft. over the life of the place, plus whatever distance the locomotive normally ran on the entry. But if it were assumed that 150 ft. was the average and 6-ton cars were employed, total changing time for the life of the place would be 200 minutes (trip speed approximately 3½ m.p.h., including stops).

If, on the other hand, the maximum one-way distance was kept under 100 ft. for the life of the place by spur tracks, pick-ups and the like, average one-way distance would be 50 ft. and the average time for a car change would be one-third minute, or 1⅓ minutes per cut, or 67 minutes for the life of the place. Perhaps a 20-second car change is pretty fast, but 30 seconds is not unknown and 40 seconds fairly common. At 30 seconds, or ½ minute, total changing time for a place would be 100



minutes, a saving of 100 minutes as compared with changing on the entry. If the average loading rate were 2 tons per minute, enough time would be saved in one place in two weeks to a month, depending upon number of days and shifts worked, to load 130 tons additional, allowing 35 minutes for moving. If only a 3-ton car were used, the saving would be 225 minutes, and so on. In point of seconds saved per change, the net might not seem worth talking about. But over a period it means a substantial increase in time available for loading with improvement in efficiency.

Balanced Equipment and Cycle Help Loading

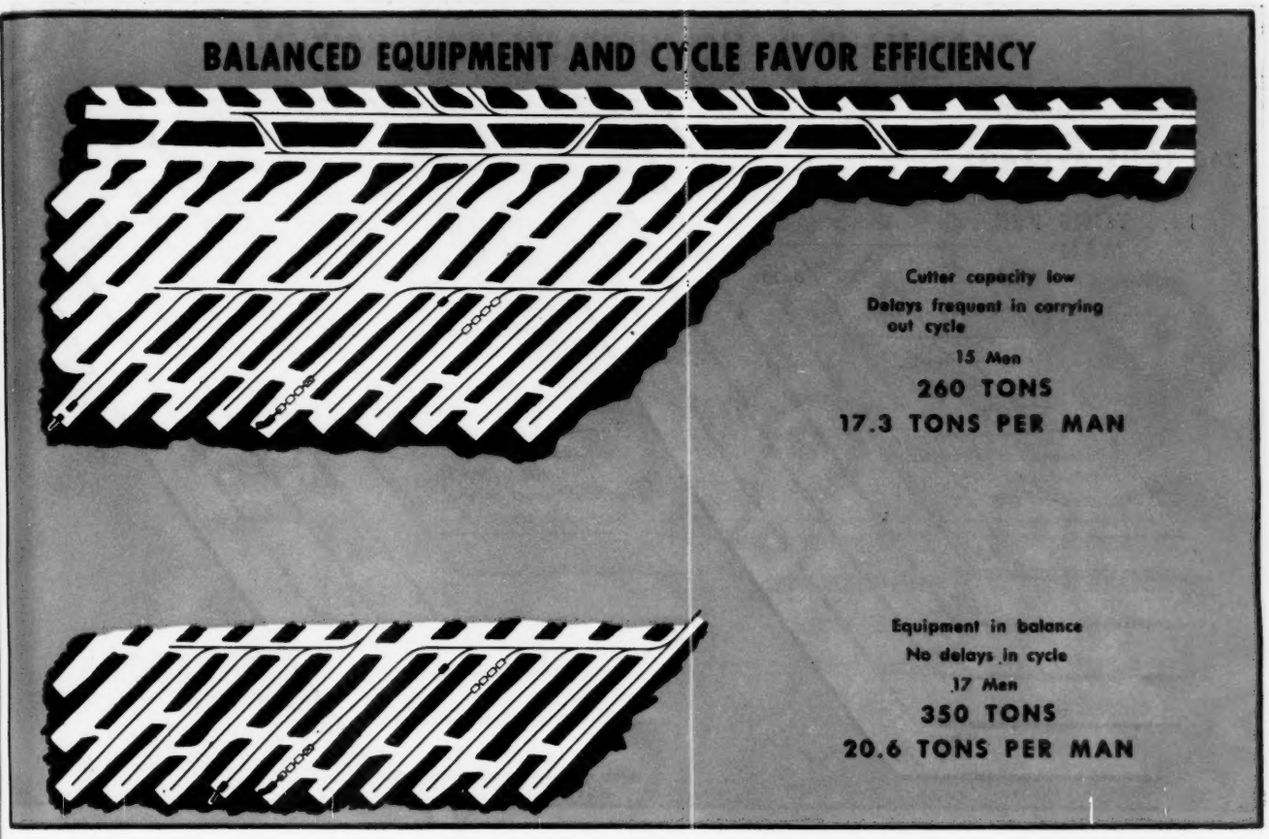
TAKING the hitches out of mechanical mining is an excellent way of increasing effective working time with consequent rise in unit tonnage and individual productivity. As stated, the starting point should be the capacity of the loading machine or other coal-handling unit.

Where do hitches originate? Three prolific sources of trouble are:

1. Lack of balance in auxiliary equipment.
2. Failure to perform a step or so properly in the cycle.
3. Failure to keep equipment in shape to operate continuously, meaning lack of proper inspection, lubrication and other maintenance.

The third point will be discussed later in this study of how to increase tonnage. The question of balance in equipment can be illustrated by taking as an example a loading machine capable of cleaning up 15 places in a day. If the cutting machine, however, can cut only twelve places a shift, it is manifest that the loading machine is being handicapped by lack of capacity in the cutter. By buying a new cutter, rebuilding the old, increasing width of place, making a deeper cut, etc., it may be possible to increase the unit output materially with no increase in number of men employed. Or, if more men need to be added because of the extra coal being produced, it is highly likely that the number will not be as great in proportion as the rise in tonnage. Thus, individual productivity would be increased and a better utilization of the equipment would be achieved.

Aside from striking a balance in equipment which might involve machinery now hard to get, tightening up the face cycle can yield substantial dividends with little or no expenditure. Numerous



things can happen which, under hand-loading conditions, might be of relatively little importance but which throw a mechanical loading unit badly off. Examples include: failure to extend track in time, failure to keep up timbering, failure to bugdust a cut properly, failure to take care of slate, failure to take care of water, failure to cut or drill properly, etc., including, even, failure to ventilate properly.

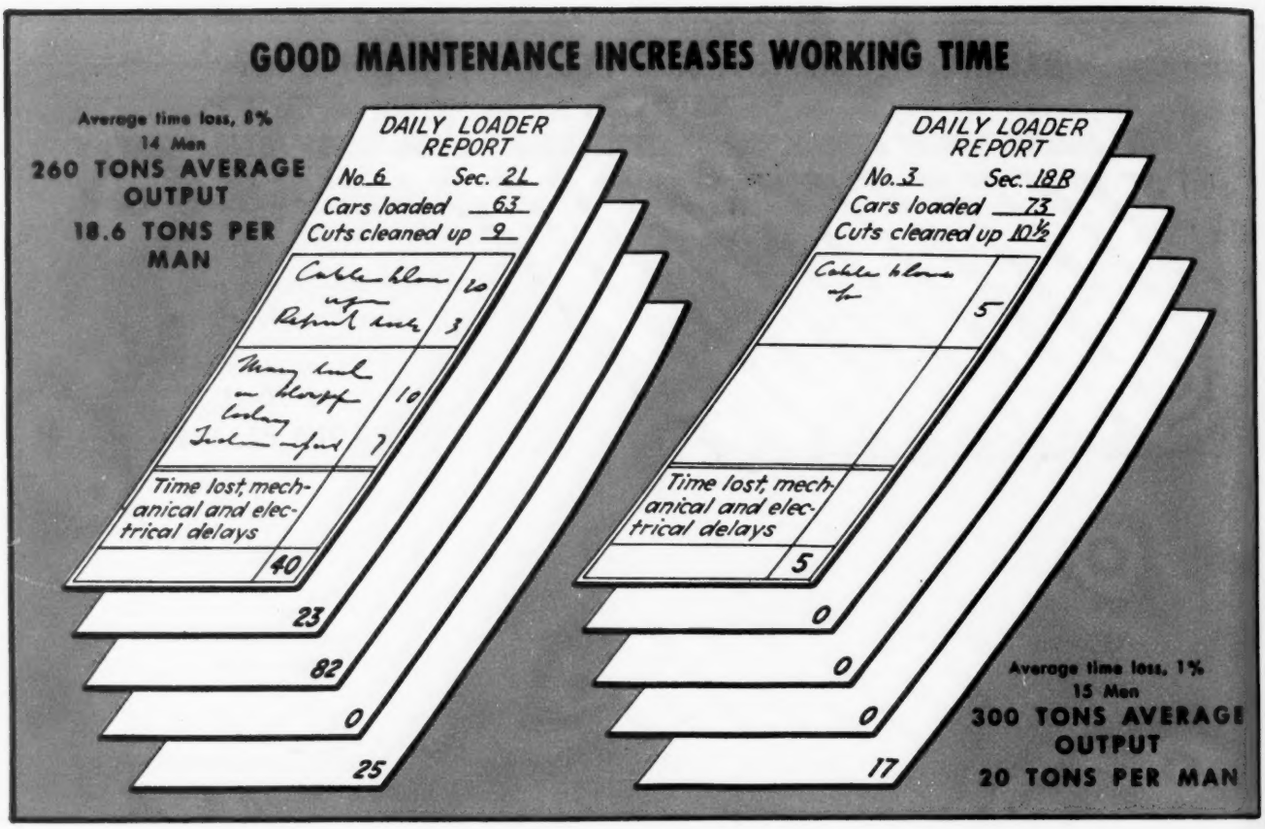
Improper ventilation often is the cause of more lost tonnage than is realized at times, aside from the safety aspect. Waiting for smoke and dust to clear or working in hot, stale, smoky air can reduce materially a man's enthusiasm and ability to produce, with consequent adverse effect on tonnage. Air should not be allowed to just glide past the room necks with the hope that some of it will get to the face. Rather, positive steps should be taken to direct it to the face in ample quantity for the job.

Then there is the tight fall due to failure to cut, drill or bugdust properly. This is a classic example of what can happen when every step in a cycle is not properly performed. If digging out a tight fall a day requires 10 minutes, tying up, as an example, a 2-tons-per-minute machine that much longer in a place, the moral is self-evident. The same is true of failure to perform any other step to prepare the way for the machine, for the loaders on conveyors and the like. If nothing else will help, putting on more men may be the answer, always keeping in mind that such men are an asset as long as they increase individual productivity.

Good Maintenance Insures Good Performance

In addition to other things that may happen, when a machine doesn't run it doesn't load coal. Therefore, to get the most out of the investment in both equipment and manpower, the best in preventive maintenance should be the rule. This normally involves:

1. A qualified repairman on the section.
2. Regular inspection (daily or oftener) by both the section electrician and the machine operators.
3. More thorough inspections in the nature of quick overhauls at regular intervals; perhaps once a week or every two weeks.
4. Careful, systematic lubrication, with the right lubricants, by qualified men.
5. Bosses who know their equipment and how it should be maintained.



6. Operators well trained in handling their machines and well versed in the consequences of abuse.

7. A system of records and reports designed to show machine condition and reveal needed repairs before major breakdowns occur.

8. Repair parts close at hand and in sufficient quantity to do the job.

The question of keeping repair parts and supplies close to the working section will be the subject of a later part of this study. And there are, of course, other measures which might be taken to keep equipment in condition to operate practically continuously. Many mines, by adopting part or all of these principles, have been able to cut the time lost due to mechanical and electrical failures to 1 percent or less.

Simple failures can cause costly stoppages. Among these are cable failures. Most such failures occur at temporary splices or other points where even a cursory inspection would reveal a bad condition. In addition to time and tonnage losses, cable failures also can cause severe personal injuries and, even, fatalities. The remedies are simple:

1. On the first off-shift, cables with, say, a total of five or more temporary splices or other spots which may turn into failures should be exchanged for new cables or old cables rebuilt by vulcanizing, using short-length high-capacity splicers or connectors.

2. Or, all potentially bad spots should be repaired and all splices made with an eye to permanency by a specialist, using short-length high-capacity connectors and wrapping the joints carefully with self-vulcanizing tape.

Adequate lubrication can reduce mechanical wear to a minimum, and, since most electrical failures result from mechanical failures, good lubrication can be an asset in electrical maintenance (although loose or misplaced oil is not good for insulation).

While, in some cases, lubrication crews can be charged with inspection, better results usually are obtained by separating the two activities. Machines should be inspected at least once a day by a maintenance man during working hours, during the lunch period or after the shift. Once a week a more complete inspection should be made and more thoroughgoing repairs made, preferably by the same man with assistance as required.

Records should be kept of all inspections, and these should note all doubtful or bad conditions and the repairs made. To take care of periodic general overhauls without interfering with production, spare machines are imperative.

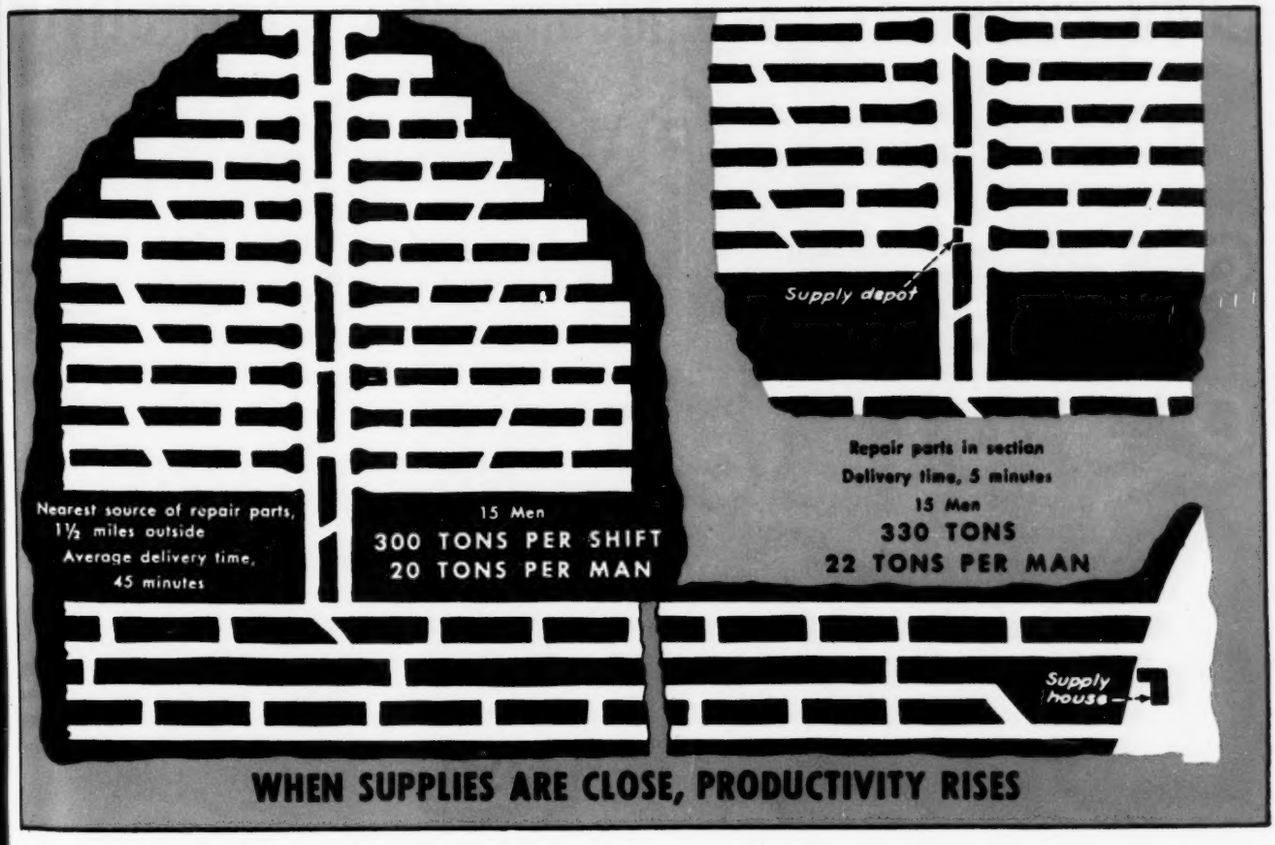
Lubrication begins with the selection of the minimum number of grades of oil and grease of suitable quality. Then follows providing adequate tanks, drums, cans, pumps, etc., for clean, convenient storage and application. Experience has in-

dicated that lubrication can be handled efficiently three ways:

1. By the machine operator.
2. By maintenance men.
3. By special lubricating crews equipped with trucks fitted with power pumps.

Size of the operation and number of shifts worked usually will determine the system employed. Where but one or two loading machines are employed, the operators naturally fall heir to the job of mastering lubrication. With several units in a mine or section, the maintenance men can be assigned to lubrication. Mines with upward of ten or so loading machines may find special lubricating trucks and crews a paying step. With three-shift work, lubrication crews and work should be organized for speedy application during the lunch period, between shifts or, if necessary, during specially arranged and brief-as-possible stops during the working shift.

Keeping Supplies Close Cuts Tonnage Losses



WHEN SUPPLIES ARE CLOSE, PRODUCTIVITY RISES

MATERIALS and supplies constitute, next to labor, the largest single class of expenditures in coal mining. By the same token, the presence or lack of the right supplies, including repair parts, can be the difference between relatively insignificant and major losses in tonnage and individual productivity.

For underground mining, materials and supplies mostly fall into two general classes:

1. Items in steady demand, such as timber, rail, explosives, lubricants, and the like.
2. "Emergency" items, such as renewal parts for mechanical and electrical equipment.

Materials in the first group can be delivered with reliability and dependability by the regular haulage crews or supply crews working on the offshift, although such delivery systems should be set up and checked to make sure that they do not fall down in a time of need.

Setting up a distribution system for items in the second group involves study of operating and delay records and striking a balance between probable frequency of use, cost of specific parts (whether large or small) and tonnage losses resulting from delays to determine which parts or items should be kept in the central supply house, in the supply

house at the mine, in the central supply room underground, in the section supply shanty and in the machine tool box and maintenance man's tool kit.

Records of trouble, including total delays and tonnage losses, broken down to show the time required to get the repair material to the job, indicate which supplies should be stocked at what points. Obviously, if a $5 part is involved and the records show that four "during-shift" renewals are made in a section in a three-months' period, that part should be stocked in the section where it can be obtained in 5 minutes, compared with 45 minutes to bring it from the central underground shop or the outside. The 40-minute saving, it will be noted, will permit a 2-ton-per-minute machine to load some 50 or 60 tons, with due allowance for moving.

The rule should be to keep frequently needed parts, especially if not too expensive, in or close to the working section. Even a part or unit involving considerable money may be kept reasonably close by spotting it at a central location convenient to several sections, although there comes a time when the time involved in replacement dictates taking the machine out and putting in a spare, if it is available, rather than attempting to repair it during the working shift.

Good Power at Face Means High Productivity

MINING EQUIPMENT is power-operated, meaning electric power in the majority of cases. It follows, therefore, that how the equipment operates depends upon how it is supplied with power. Mechanical mining necessitates making power supply a major, if not the first, consideration. Since good power is largely independent of natural conditions, making it good depends on engineering management.

Low voltage and interruptions affect cost and efficiency from a number of angles. First, production drops as a result of slower operation of equipment and interruptions in the flow of power to the face and other points of use. Second, bad power also has a psychological effect, reflected in a disinclination of men who work with it to put forth their best efforts. Third, breakdowns resulting from overheated motors and auxiliary equipment are directly reflected in lower production. Fourth, maintenance costs are increased. Fifth, power cost is increased through waste of energy and prolonged demands.

Few and fairly simple measures will insure the maintenance of effective, economical voltage at the working face. These include:

1. Keeping substations (a.c. or d.c.) close to or in the working sections. Good rules are: 275-volt d.c. substations within 2,500 ft. of the farthest working face; 240-volt a.c. substations within 600 ft. of the farthest working face. Making substations portable is a major step in achieving these goals.

2. Bonding tracks, including those on room entries, and keeping every bond in good condition. For short-lived tracks, late methods of bonding should be investigated, including quickly reclaimable bonds and light-weight drilling equipment. For permanent tracks, welding is an excellent alternative to bonding.

3. Using ample feeder capacity and running feeders to the necks of the farthest rooms. In d.c. systems, where stationary substations are employed, minimum size of feeder along the mains should not be less than 1,000,000 cir.mils, with not less than 500,000 on the room entries. Where substations are portable, the size should not be less than 500,000 cir.mils in both locations. Buying or cutting room-entry feeders into 50- to 200-ft. lengths with quick-connection terminals is a great convenience and facilitates installation when and where needed.

4. Installing auxiliary returns along main lines and in room entries to balance the circuits and provide a degree of protection against slow-downs until broken bonds can be repaired. The auxiliary returns should be cross-connected to the rails at 200- to 400-ft. intervals. Cross-connections should be tested frequently with a hook-on ammeter. Current at this point usually indicates a broken bond.

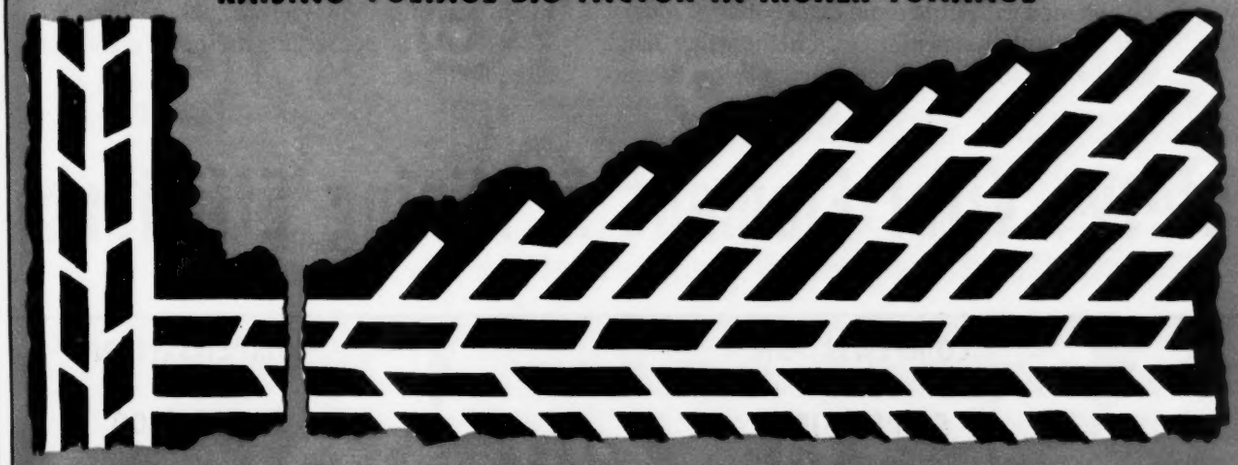
5. Using oversize conductors in trailing cables and using lengths as short as possible for the standard duties. Extensions should be provided for emergency or infrequent jobs.

6. Checking face power regularly with an indicating voltmeter. The whole story is revealed if a graphic voltmeter is on the line at the room neck at the same time and the results are compared.

7. Localizing power interruptions to small sections or a few units by automatic circuit breakers and/or lines separate from the trolley for the face machinery.

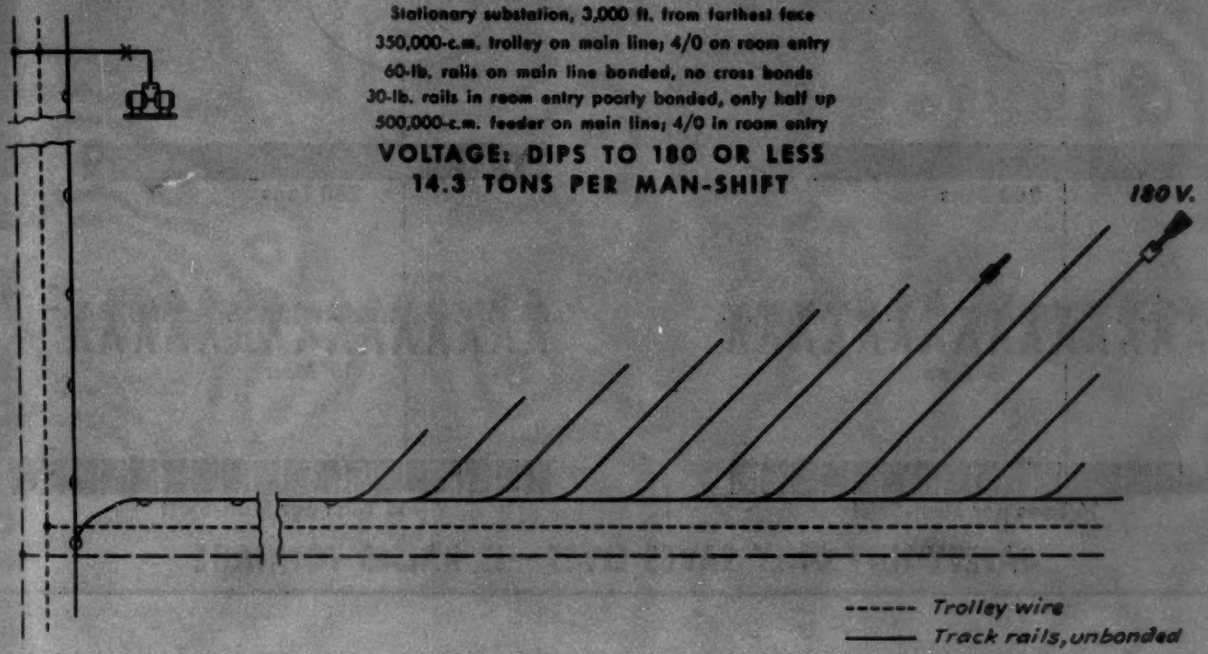
What can be expected of a good power system as compared to a poor one? Plenty, as the accompanying illustration shows. In this case, power revisions were the major factor in the improvement in individual productivity. Even if the savings were not as great as those shown, they still can be substantial. Often, merely by keeping on top of

RAISING VOLTAGE BIG FACTOR IN HIGHER TONNAGE



Stationary substation, 3,000 ft. from farthest face
350,000-c.m. trolley on main line; 4/0 on room entry
60-lb. rails on main line bonded, no cross bonds
30-lb. rails in room entry poorly bonded, only half up
500,000-c.m. feeder on main line; 4/0 in room entry

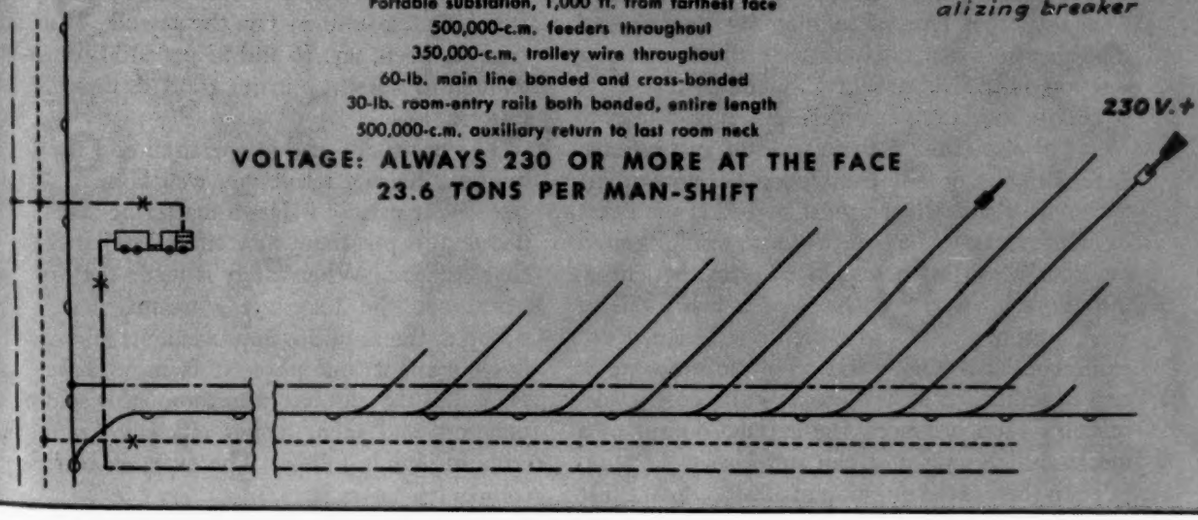
VOLTAGE: DIPS TO 180 OR LESS
14.3 TONS PER MAN-SHIFT



Trolley wire
Track rails, unbonded
Track rails, bonded
Feeder
Auxiliary return
X Automatic sectionalizing breaker

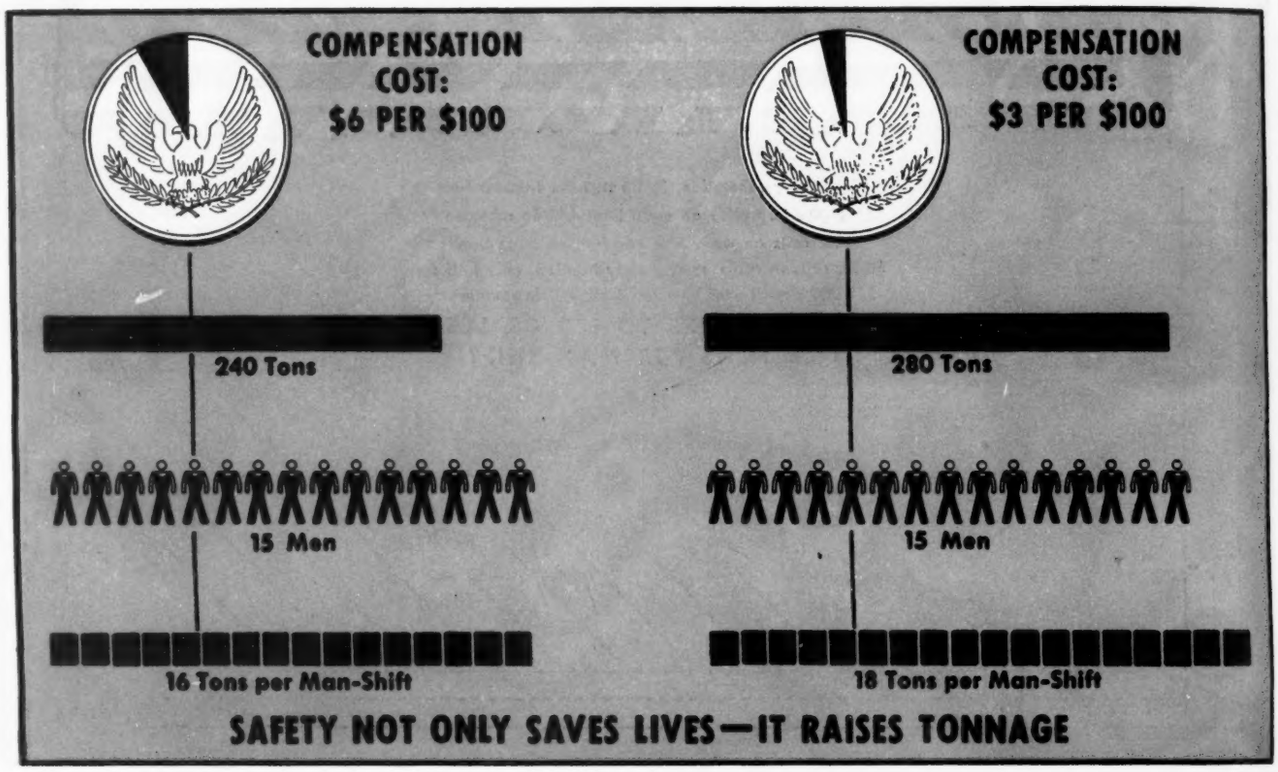
Portable substation, 1,000 ft. from farthest face
500,000-c.m. feeders throughout
350,000-c.m. trolley wire throughout
60-lb. main line bonded and cross-bonded
30-lb. room-entry rails both bonded, entire length
500,000-c.m. auxiliary return to last room neck

VOLTAGE: ALWAYS 230 OR MORE AT THE FACE
23.6 TONS PER MAN-SHIFT



distribution and making sure that things are done when and how they should be done, the results can be obtained with little or no extra outlay of money. But substantial expenditures, on the other hand, may be warranted if voltage is much below the motor rating, because, as previously stated, bad power means direct tonnage losses, with correspondingly lower individual productivity, as well as higher costs for the power service itself and maintenance of equipment.

Safety—Vital Element in Mining Efficiency



DESPITE much work in the past, there still is a disposition to regard safety as a thing apart from efficiency. Why, it might be asked, should safety be considered a major factor in mechanical mining —or any other type of mining, for that matter? The answer is that safety directly affects unit production, individual productivity and cost.

Unsafe conditions can mean not only injuries to men but also damage to equipment and interference with the orderly completion of the working cycle. To this handicap must be added the effect of injuries on morale, plus the losses resulting from continually putting new men, even if experienced, into a crew. Just one wreck or a heavy fall of slate, even if it results in no injuries or damage to equipment, can cause a loss of 50 tons or more of coal in a shift. If lack of proper safeguards results in many such instances, the average output of a mechanical-mining unit can suffer severely.

Then there is the question of effect on cost. Just one fatality in mining 350,000 tons of coal, if it involved $7,000 in compensation (frequently the cost is much more), would increase the cost 2¢ per ton. Or the question might be considered from another standpoint: assessments on the payroll. The difference between, say, $6 and $3 per $100 certainly is enough to warrant a major effort to improve conditions.

The principles of safe operation and the methods of achieving results are well known. Consequently, it usually is just a matter of making the decision to put them into effect—and sticking to that decision. When safety is made the first consideration, the necessary standards have been adopted, the requisite improvements and changes in equipment and physical facilities have been made and the idea has been thoroughly sold to supervisors and men, higher efficiency and lower costs inevitably follow. The experience of many companies proves it.

GAS REMOVED

By Putting Vacuum Pumps on Boreholes

Development Workings Practically Freed of Gas by Pumping—Boreholes From Surface Stop in Rock Strata Many Feet Above the Coal Seam—Vacuum in the Strata Extends Over a Large Underground Area

VACUUM PUMPS on the surface at the tops of boreholes and operating 24 hours per day are pulling the gas so effectively from strata overlying a coal seam that development work in that seam, now 5,000 ft. ahead of one of the pumps, is practically free of gas. At the mine, near a fault boundary of the Pocahontas field on the border of Virginia and West Virginia, a group of headings being driven into a virgin territory had gotten so hot with methane that the work was difficult. The boreholes which relieved the situation and are now being pumped extend less than half way down to the coal, but their effectiveness in creating a vacuum over a large underground territory is attested by the fact that upon power failure the pumps are reversed by the inrushing air and will run for many hours at high speed.

In this territory the bed lies fairly level and the general direction of the development parallels the line of the fault and is about 4,000 ft. from it. Cover at one of the pumps—both near a State highway and on the floor of a narrow valley—is 180 ft. Total cover ranges up to 800 ft. in the immediate hills on each side. The seam is continuous to an outcrop three miles from this territory and no other seams are present in the 180 ft. of cover.

Positive Blowers Installed

Each pumping station consists of a Victor-Acme rotary positive blower or gas pump made by the Roots-Connersville Blower Corp. Because the installations originally were experimental the blowers were selected without particular regard for capacity required or the vacuum they were capable of producing. The first one to be installed was taken from a Mine Safety Appliances Co. high-pressure rock-dusting machine and the second is a duplicate. They are Size 710, rated 166 in. pressure (water gage) at normal speed. Motors—Westinghouse 7½-hp., 1,765-r.p.m., 220 volts a.c.—drive these pumps at 441 r.p.m. and a vacuum gage on the suction of one shows 7 to 8 lb. per square inch.

History of the development of this pumping practice goes back to 1936. At that time a 3-in. prospecting core-drill hole at a point two or more miles from any development and extending down through the coal produced a flowing water well. One-quarter mile away there existed another water well drilled as a private enterprise. Bubbles of gas came out of both these wells but not in sufficient volume to maintain a flame. Water flow from the prospect hole stopped, however, because children apparently had dropped rocks into it. When mining development had progressed to that locality, water in the private well, 80 to 100 ft. deep, disappeared and a moderate and continuous flow of gas appeared.

About this time an excessive quantity of gas was encountered in the mine workings 170 ft. under the surface and near the original 3-in. prospect hole. This led to the experiment of drilling another 3-in. core hole to a depth of 85 ft. nearby. In the course of this drilling the water was lost at 80 ft. but gas had begun to flow when the well was down to 70 ft. In the first 30 ft. of drilling from the surface the hole penetrated a 15-ft. stratum of dense unbroken sandstone. From the log of the original prospect hole it had been noted that for some distance above the coal the strata are more or less broken, indicating a disturbance. Gas esti-

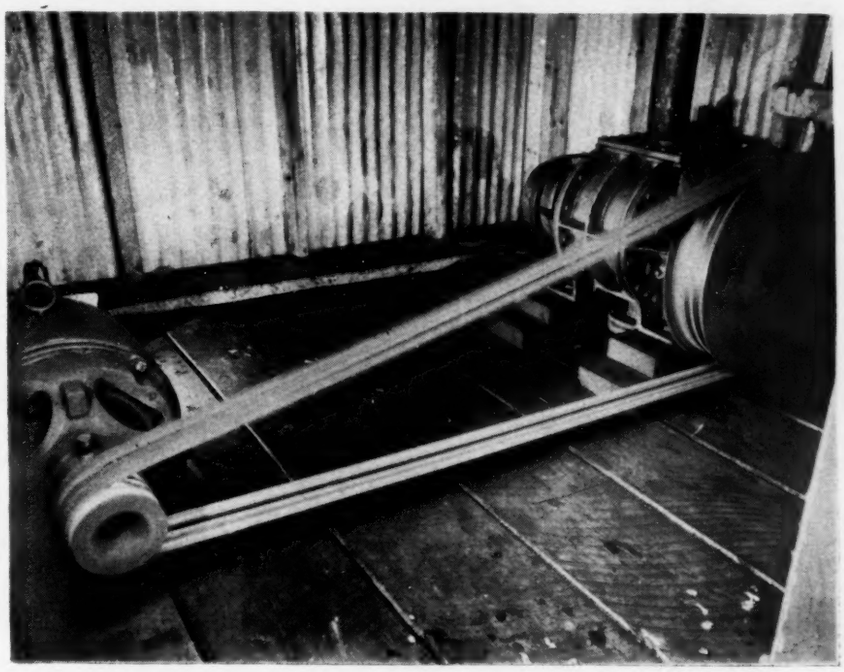


Fig. 1—This vacuum pump operates 24 hours a day pulling gas from strata overlying the coal.

mated at 150 c.f.m. blew from this second hold continuously and was gotten rid of by burning. In the next few years other holes in the immediate vicinity (1,000-ft. radius) were drilled and for a time six were draining and burning.

This flow of gas, before pumping, reduced the methane content in the development return air from about 1.5 percent to under 0.3 percent. After three years the flow of gas from the holes had dwindled to a small volume and after mine development progressed to 3,000 ft. in advance of the vicinity the quantity of gas encountered at the faces again became troublesome.

Five of the holes were capped and a vacuum pump was put on the sixth. This pump, the house protecting it and one of the capped holes are shown in Figs. 1 and 2. The other pump, Fig. 3, placed over another section of the mine, is about 2 miles from the first. Still another borehole is shown in Fig. 4. It is about 1 mile from the pump shown in Figs. 1 and 2 and is that much closer to the end of development. From it, free-flowing gas is burning continuously. The pump, Fig. 3, is 5,000 ft. behind development in its territory but is still effective in reducing the quantity of gas encountered underground.

The pumphouse, Figs. 1 and 2, is isolated where no one would know for some time if the electric power failed or if the unit stopped for any other reason. To prevent reversal of pump rotation and minimize air leakage back into the hole, the top of the discharge pipe above the house is equipped with a leather-flap check valve. The other rotary pump is close to a residence so it is desirable to waste the gas by burning at the top of the pipe. Here a flap-type non-return valve at the top would be impractical because of the heat. Moreover, it is not badly needed because cessation of the pump noise is noted by someone at the residence who is available to bring the reversed pump and its motor to rest and then restart it if the power is on.

When power is cut off the motor, the pump stops quickly and restarts in reverse "right now." How long the inrush of air would hold out is not known. At one time one of the pumps, without power, ran reversed for four hours and at the end of that time seemed to be going as fast as ever. This action plus an effect extending at least 5,000 ft. underground from that vicinity indicates the large area of porous or broken strata through which the gas is being moved.

Fig. 2—In the foreground is a capped hole that formerly discharged gas. The building houses a pump. The discharge pipe above the roof is equipped with a leather-flap check valve.

Fig. 3—This borehole is discharging without a pump. The tapered box, top of the pipe, keeps the wind from extinguishing the flame.

Fig. 4—This building also contains an operating gas pump. The flame from the burning gas being exhausted is visible at the top of the pipe.

Beginning of a new mine—strip shovel digging in at Streamline

STRIP HAULAGE

Tuned to New Conditions at Streamline

Longer Haul Dictated Larger Truck Capacity—15-Ton Trucks Converted to 35-Ton Tractor-Trailer Units — Diesel Engines Adopted for Reliable Power—Good Roads Stressed to Maintain Efficiency

IN THE early winter of 1936, the Southwestern Illinois Coal Corp. began a stripping operation at Percy, Ill. The larger and more important pieces of equipment were a Marion 5560 26-yd. stripping shovel, a Marion 4127 7-yd. loading shovel, ten 15-ton Mack side-dumping trucks driven by gasoline engines and a McNally-Pittsburg washery.

Among the items differing from practice at neighboring strip mines were the use of two hoist generators on the stripping shovel, a 7-yd. dipper on the loading shovel, a wire-armored cable on the highwall, Type SH-D trailing cables for the shovels and splashproof motors with weatherproof control for the portable pit pumps. These modern trends have contributed no small part to the practically uninterrupted operation of this mine.

The stripping shovel, which is not counterbalanced, is driven by a 1,100-kva. 0.9-power-factor synchronous motor. A noteworthy change from previous practice was the use of two 300-kw. generators, instead of the customary single generator, to drive the two hoist motors. This reduced generator voltage to 250, alleviated the tendency to flash over and provided ample power. Results of the six years of operation have justified this construction.

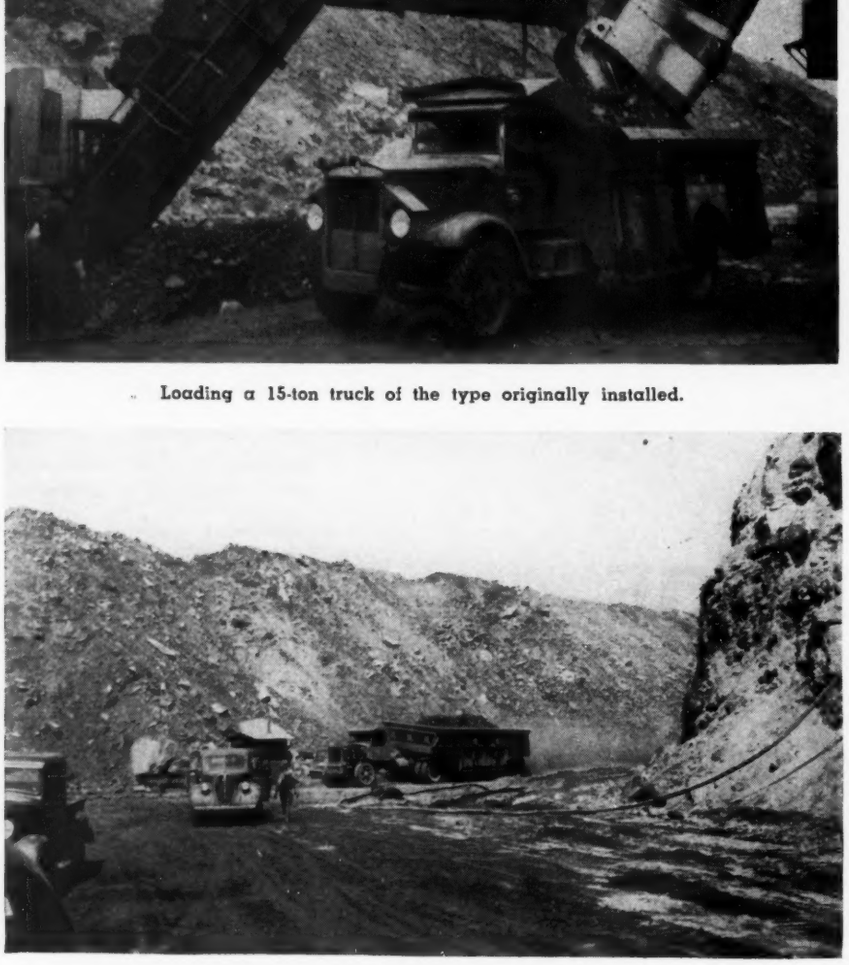
The loading shovel, with the first 7-yd. dipper in this field, has loaded close to 5,000,000 tons of coal with little time out. The aluminum dipper, protected with steel belts, has stood up well, being still good for more millions of tons.

Highwall cables had been used in this field since 1928. But for the first time this mine installed five 1,000-ft. lengths of 5,000-volt 4/0 3-conductor Type SH-D steel-wire-armored cable for power distribution. These sections were connected through junction houses, where taps were taken off through primary fuses and weatherproof oil circuit breakers.

Rubber-insulated trailing cables reach from the circuit breakers to the shovels. These also are Type SH-D, having a copper braid over each conductor for the protection of men handling them. A short pole line connected the first length of armored cable with the 33,000-volt power substation.

The original haulage was relatively easy because the haul averaged but about ¾ mile one way. Also, the overburden at that time was not deep and digging was rapid. With a loader

Loading a 15-ton truck of the type originally installed.



New haulage unit on its way with a 35-ton load.

Trailers dump sideways into the raw-coal bin.

of large capacity, daily production ran around 4,000 tons or better.

The Mack trucks, equipped with gasoline engines, used two 12x12-in. tires on the steering wheels and four 14x12-in. tires on the single rear axle. The dumping doors on each side of the bodies were air-operated. These trucks were used slightly over three-years—from late 1936 to early 1940—by which time the first pit was worked out.

Since the pit was very close to the washer, the length of roadway outside the pit was short. Some experimentation had been conducted with concrete-slab and cinder construction in early days, but this did not prove satisfactory. With the opening of a new pit four miles away, however, haulage became the major problem from the viewpoint of truck capacity and adequate roadway. The first was solved by an elaborate rebuilding program in which the trucks were converted to tractors and semi-trailers with 35-ton bodies were installed with no addition to the number of units in the fleet.

Trucks Rebuilt

All the 15-ton bodies were removed from the truck chasses. A fifth wheel was then mounted on each chassis, about 15 in. ahead of the rear axle, to which the front end of the trailer is attached. The rear wheels of these Mack trucks are chain-driven from the differential shaft. To lubricate this drive chain continuously, an oil reservoir is mounted across the rear of the chassis, with two petcocks adjusted to control the drip of oil. These oil tanks are made of 3-in. pipe.

The rear end of the trailer is carried by a 4-wheel Fruehauf tandem-axle running gear, using eight 12x24-in. tires. The bodies are Gar Wood, 35-ton, side-dumping, equipped with two air-operated doors on each side. Coal is dumped both ways from a central runway which spans the storage bin. The air brakes are Westinghouse.

Soon after the trailers were put into service, the gasoline engines were discarded in favor of diesel-type oil engines. They were coming into fashion and promised savings in fuel and maintenance. The whole fleet, therefore, was equipped with Cummins 200-hp. 1,750-rpm. supercharged diesel engines. Rotary-type superchargers supply the intake with air at 2-lb. pressure. This supercharger, as well as the Bendix-Westinghouse 12-ft. air compressor, is mounted on the engine frame and driven by V-belts from the engine shaft. Without the super-

charger, the engine horsepower would be only 150.

Recently a new pit has shortened the haul, but heavier overburden cut down the tonnage. While this fleet of trucks has a capacity of 5,000 tons per day, the average daily output in the last year has been 3,600 tons; loading time, 257 days.

The fuel consumption of these trucks has averaged 1 gal. for 1.5 miles. A steam-heated 55x190-ft. garage with supply and repair facilities at one end provides storage and maintenance space for the fleet. Among the tools is an air compressor for tire inflation, a steam Jenny for thorough cleaning of any part to be removed and the usual hand tools. Special tools, some of them made by the maintenance foreman, are available for diesel-engine repair—particularly oil-fuel pumps. Necessary machine and blacksmith work is done at the machine shop nearby.

Truck power plants have been simplified by removing the usual battery-starting equipment. Engines are started in the morning with a portable storage battery which is wheeled along in front of the trucks and "plugged in" in turn. As long as shop temperatures are not under 60 deg. F., the engines start right off. A trickle charger keeps a number of batteries ready. Once started, the engines run continuously throughout the day. If an engine should go dead during the work period, another truck gives it a push. As long as the engines are hot, they may be easily started in this way.

Besides being more powerful than the gasoline engines they replaced, these diesel engines have proved more reliable; the oil does not carbonize around the piston rings and maintenance cost is lower. Because of the high pressures involved, fuel pumps require careful attention. A point strongly in their favor is that exhaust fumes are much less toxic than from gasoline.

Inspection, lubrication and tire pressures are in line with the practices encouraged by truck, engine and tire builders. These rules call for daily inspection of water and fuel pumps, air compressors, belts, air lines and lubricating devices. Engine oil is changed every 50 hours of operation; wheels are packed every six months. Long life of roller-type wheel bearings is evidenced by the fact that only four such bearings have been changed in the entire operating period. The maintenance crew consists of a foreman, an oiler and mechanic.

Good Roads Help

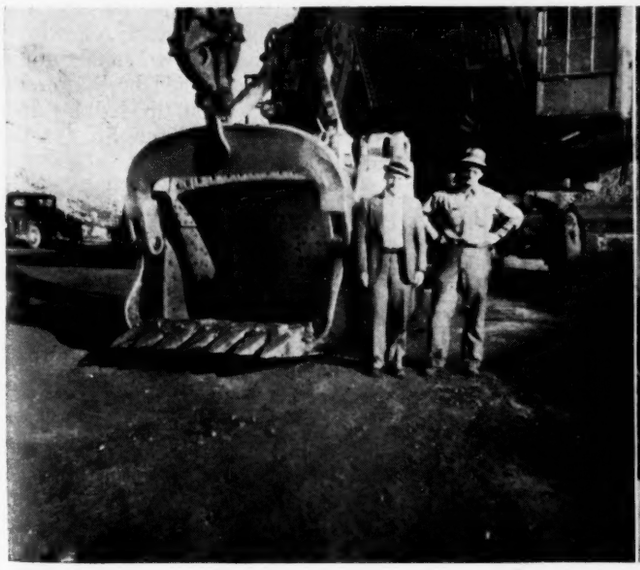
Good roads, a must for good tire life, have been a large factor in maintaining the consistently uniform production of this mine. Materials imported for use have been crushed stone and road oil. The grade of limestone varies from 2-in. crusher run to chat, depending upon conditions. Since the war banned the use of oil, some asphalt has been substituted at twice the cost for half as high quality.

When most of the roads were built, road oil was available. Roads were then built by making a subgrade of clay, on which 2 to 3 ft. of washer gob was laid. This was surfaced with crushed rock until it ceased to disappear. The quality of stone varied greatly with the weather and the season of the year. After the stone was compacted by traffic, a binder of clay was laid on the surface and treated with oil. When compacting the road, trucks are driven alternately to the right and to the left. This treats the whole surface alike.

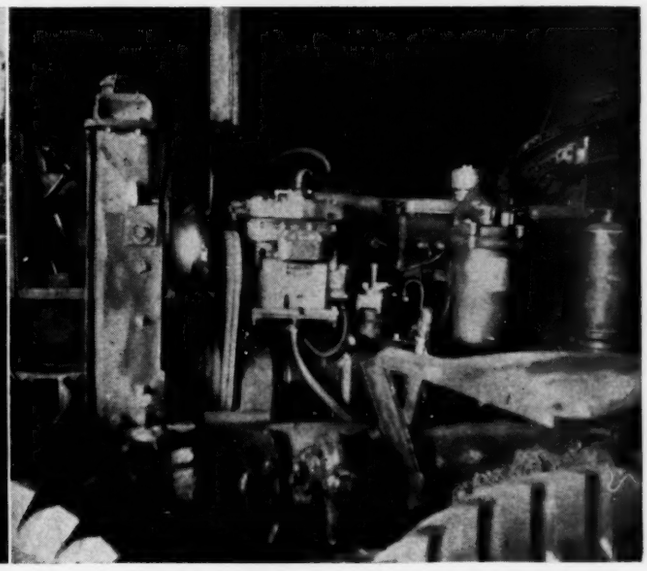
While it is not always possible to build roads in summer weather, that is when they should be built. Frozen material in the subgrade will develop soft spots when thaws set in. These are expensive to repair because of the large quantity of stone they will absorb. At one time this company used 13,000 tons of stone while mining 40,000 tons of coal. In its experience, the secret of a good road is a well-compacted subgrade, built high enough to drain, on which is laid a waterproofed crushed-stone surface.

Drive-to-the-right traffic ridges the empty lane much more than the loaded lane. The loaded lane may even stay smooth, while the bouncing, skidding wheels of empty trucks create rough ridges. In the loaded direction wheels are held to the road by lower speeds and 35 tons of coal.

Maintenance practice at this mine depends on the weather and the condition of the surface. In dry weather a sprinkler and a drag are used daily to keep it in condition. In wet weather sand is spread to dry up the water. When the surface becomes too rough, it is scarified and releveled. "Good roads are more than half the haulage problem."



This aluminum loading dipper still is good for many more millions of tons.



Heart of a Streamline haulage unit—200-hp. supercharged diesel engine.

BALANCING AIR FLOW

To Get the Benefits of Split Currents

Advantages of Using a Booster Fan to Reduce Free-Split Pressure—Making New Openings or Sinking New Shafts to Supply Free-Split—Drillholes as an Aid in Ventilation or Sinking Work

By J. H. DICKERSON
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Huntington, W. Va.

NATURAL splits are seldom equal in length or provided with the desired volume of air. Where splits are the same, except for length, the shorter split will get the more air unless regulators are used. With natural splits, the longest usually gets insufficient air unless excess air is provided for the shorter splits, but this means an unnecessary volume of air at the fan. To get 10 percent more air in a natural split generally means 10 percent more air at the fan, and increases the power bill about 33 percent.

When regulators are installed in the short splits, or ones requiring lower air quantities, the quantities of air may be regulated as desired, but the splits with the regulators will require the same pressure as the free split. A regulator sets up a resistance equal to the pressure necessary to bring it up to that of the free split. The power required to move a given quantity of air in a split varies directly as the pressure, and regulators mean extra power for the air being handled. Where regulators are used attention should be given to reducing resistance in the free split only, as there is no advantage in cleaning up splits having regulators.

To reduce the pressure in a free split we should consider:

1. If it is possible to reduce the air in the free split. This may be done by diverting more air to the regulated splits or reducing the total quantity.
2. Whether falls in the free split may be removed or leveled, or gob cleaned up along the sides, to reduce resistance.
3. Whether entries in the free split are partly blocked by water or heaving bottom, causing higher resistance.
4. The possibility of providing additional airways for the free split.
5. If it will pay to increase the cross-section of the free split by taking top or bottom or widening.
6. If the free split may be shortened by new connections.
7. The possibility of ventilating the free split like a separate mine.
8. The use of a booster to reduce the pressure in the free split.
9. Making a new opening or air shaft to supply the free split.

This article deals especially with Items 8 and 9.

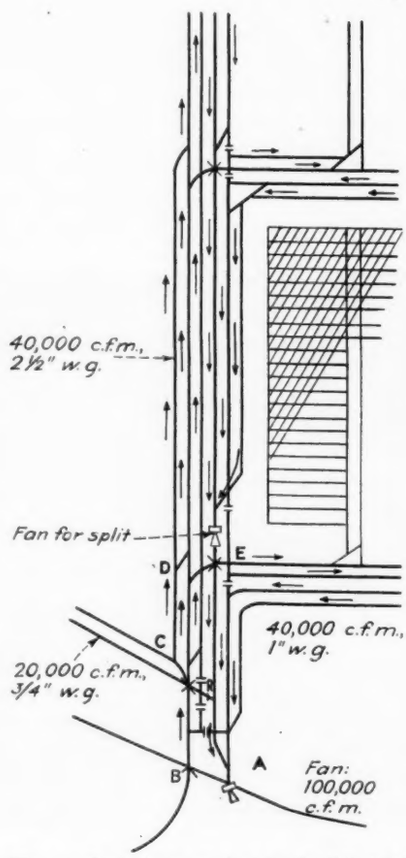

Fig. 1—How booster fan is installed in split to benefit mine ventilating system.

Fig. 1 is an outline of a mine which may be ventilated entirely by a fan at *A*. At *C* there is a split to the left, and at *D* there is one to the right and another ahead. With 100,000 c.f.m. at the fan we will consider a resistance of 0.5 in. w.g. for moving the air in Section *A-B-C-D-E*; 0.75 in. w.g. for 20,000 c.f.m. in Split *C*; 2.5 in. w.g. for 40,000 c.f.m. ahead of *D*; and 1 in. w.g. for the 40,000 c.f.m. in the split to the right of *D*. The free split will be the one ahead of *D*. Regulators will be required in the ones to the right and the left. The total pressure at the fan will be 3 in. w.g. Allowing 80 percent for fan efficiency we have 100,000 divided by 33,000, multiplied by 3, multiplied by 5.2, multiplied by 1.25 (100 divided by 80), which equals 59.1 hp. at the fan.

If we put a booster fan ahead of *D-E* to handle 40,000 c.f.m. at a 1.5 in. w.g., we reduce the pressure for the splits to 1 in. w.g., and that for the outside fan to 1.5 in. w.g., and only the split at *C* will require a regulator. This would mean power as follows:

100,000 divided by 33,000, multiplied by 1½, multiplied by 5.2, multiplied by 1.25 (100 divided by 80), which would equal 29.6 hp. for the outside fan.

40,000 divided by 33,000, multiplied by 1½, multiplied by 5.2, multiplied by 1.25, which would equal 11.8 hp. for the booster fan.

Total horsepower for the two fans at 80-percent efficiency would be 41.4.

Comparing one outside fan against one outside fan with a booster, one year continuous running, power at 1½c. per kilowatt-hour and an allowance of 20 percent for belt and motor losses, we have the following:

59.1 divided by 1.34, multiplied by 1.2, multiplied by 0.015, multiplied by 24, multiplied by 365, which equals $6,955, outside fan only.

41.4 divided by 1.34, multiplied by 1.2 multiplied by 0.015, multiplied by

24, multiplied by 365, which equals $4,872 for both the outside fan and the booster.

The approximate power saving for one year with the additional booster fan, assuming 80 percent efficiency for the fans, therefore is $2,083. As the outside fan and booster both operate at 1½ in. w.g., it would be possible to use two ordinary disk fans. These are cheap and easy to install, but probably would require over twice as much power as two modern fans at 80-percent efficiency. One outside fan at 60-percent efficiency probably would use less power than two common disk fans. In many places booster fans are not permitted, even where there is little if any explosive gas in the return airway. However, these fans have been used with safety to improve ventilation and reduce power costs. Where they are used it is well to have an adequate outside fan for emergencies. Boosters would seem to be safe in coal mines where doors are not installed, stoppings are good and tight from the outside to the booster location and the motor operates in fresh air. In the above example the fan is in the return, but it could be arranged to run the motor in intake air, which travels only a short distance from the outside to the point where the fan motor would be located.

Where two seams are worked from the same shaft the top seam workings generally are more extensive and both seams probably will have unbalanced splits. In Fig. 2, intake and return air shafts are shown serving two seams, along with an outline plan of the splits for the two seams. The fan handles 100,000 c.f.m. with a 1-in.-w.g. resistance for the two shafts, and the high-pressure split requires 3 in. w.g.

If regulators are to be used in the other splits, the pressure at the fan will be 4 in. w.g. With a fan efficiency of 80 percent we have 100,000 divided by 33,000, multiplied by 4, multiplied by 5.2, multiplied by 1.25 (100 divided by 80), which equals 78.8 hp. at the fan.

By installing a booster for the long split in the top seam, to handle 40,000 c.f.m. at a 2-in. w.g., the pressure required for the other splits is 1 in. w.g., a regulator is required only in one split in the lower seam and the outside fan will require just half the power as before, or 39.4 hp. The booster will require power as follows: 40,000 divided by 33,000, multiplied by 2, multiplied by 5.2, multiplied by 1.25 (100 divided by 80), which equals 15.8 hp. The total for the two fans, at 80 percent efficiency, therefore is 55.2 hp.

Comparing one outside fan for a year against one supplemented by a booster, continuous running, power at 1.5c. per kilowatt-hour, and an allowance of 20 percent for motor and belt losses, we have:

78.8 divided by 1.34, multiplied by 1.2, multiplied by 24, multiplied by 365, multiplied by 0.015, which equals a $9,272 power cost for one outside fan only.

55.2 divided by 1.34, multiplied by 1.2, multiplied by 24, multiplied by 365, multiplied by 0.015, which equals a $6,495 power cost for outside fan plus booster.

The annual power saving by installing the supplementary booster, therefore, is $2,777. The booster will handle only fresh air from the downcast shaft. If only the outside fan were used and its efficiency were 50 percent, the annual power cost would be about $14,830 and the annual power saving would be over $8,300 with an outside fan supplemented by a booster, both working at 80-percent efficiency.

Fig. 3 shows 110,000 c.f.m. at the fan with a 3.7-in. w.g. Between A and B there is 10,000 c.f.m. of leakage. The right split has 60,000 c.f.m. at B with a 2.5 in. w.g., and the left split would handle 40,000 c.f.m. at a 1 in. w.g., but has a regulator making the pressure 2.5 in. w.g. Allowing 80 percent for fan efficiency the power requirement would be:

110,000 divided by 33,000, multiplied by 3.7, multiplied by 5.2, multiplied by 1.25 (100 divided by 80), or 80.2 hp. at the fan.

In Fig. 4 we have the same workings with a new intake air shaft near C to handle 50,000 c.f.m. with an 0.09-in.-w.g. pressure drop. The pressure drop from B to C was 2 in. w.g. for a mean of 55,000 c.f.m. Assuming the same resistance for the intake and return air, the pressure drop for 50,000

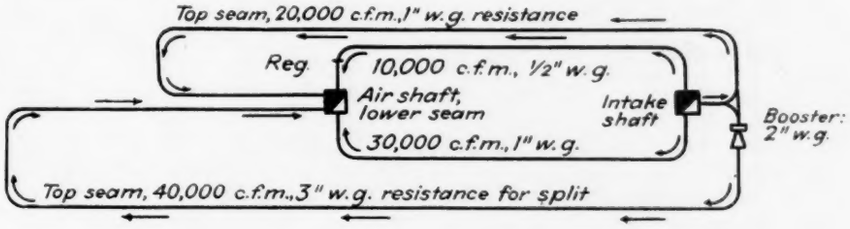

Fig. 2—Ventilating two seams from one intake shaft, using booster.

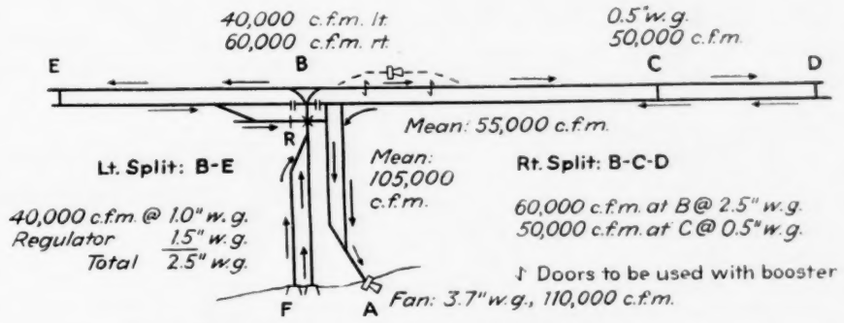

Fig. 3—Diagrammatic mining plan showing splitting practice.

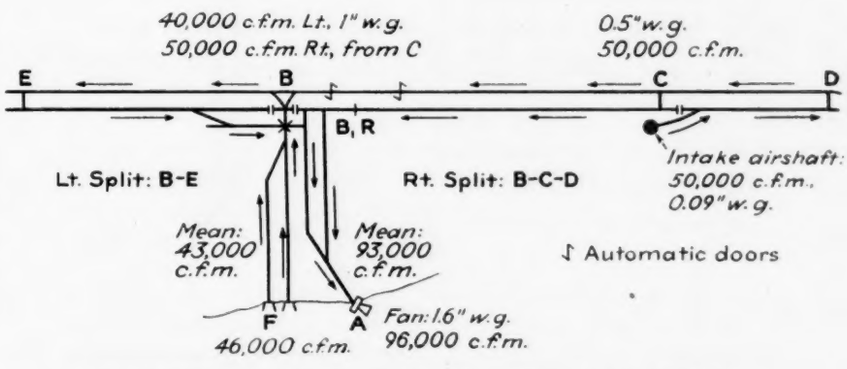

Fig. 4—Same plan as in Fig. 3, but with auxiliary intake air shaft.

c.f.m. without leakage is estimated by calculating as follows: 55 squared is to 50 squared as 2 in. is to X, or 1.65 in. w.g. As the air from the new shaft travels only one way, and the area is twice as large, the pressure drop between *A* and *B* is ½ multiplied by ¼, multiplied by 1.65, or 0.206 in. w.g. The pressure drop for the right split, *B-C-D*, is then 0.09 plus 0.5 plus 0.21, or 0.8 in. w.g.

There is no leakage in the right split now, as the air travels one way from the new air shaft, and the required return air for the two splits is reduced to 90,000 c.f.m. This will reduce the intake of air at *F*, the quantity of air from B_1 to A, and the pressure required for Section *A-B-F*. It may be seen that the pressure at the fan at *A* will be reduced about one-half, and we will assume that the leakage in Section *A-B-F* is reduced from 10,000 to 6,000 c.f.m. due to the lower pressure. This would make the quantity at *A* 96,000 c.f.m., the mean quantity from B_1 to *A* 93,000 c.f.m., and the quantity from *F* to *B* 43,000 c.f.m.

Estimating Pressure Drop

For a mean of 105,000 c.f.m., 1.2 in. w.g. was required to move the air in Section *A-B-F*. Assuming the same pressure drop for a like quantity of intake and return air, we may estimate the pressure drop by adding the results of solving the proportions 105 squared is to 43 squared as 0.6 is to X, and 105 squared is to 93 squared as 0.6 is to Y. X equals 0.1 in. and Y equals 0.47. Adding, we get about 0.6 in. w.g. as the pressure drop for Section *A-B-F*, and pressure at the fan is 0.6 in. plus 1.0 in., or 1.6 in. w.g. for 96,000 c.f.m. A regulator will be required in the right split to increase the pressure to that of the left split. If we check the leakage from *A* to *B* with the reduced pressure, we find that it would be about 5,000 c.f.m. for average conditions, but we will leave it at 6,000 c.f.m. as first estimated.

If a booster and two automatic doors were used as outlined in Fig. 3, for 60,000 c.f.m. at a 1½ in. w.g., leakage is reduced to 6,000 c.f.m. from *A* to *B*, and 1¼ hp. is allowed for the extra resistance of the runaround, the horsepower for the two fans at 80 percent efficiency will be about 63.0 (106,000 divided by 33,000, multiplied by 2.1, multiplied by 5.2, multiplied by 1.25, to which add 60,000 divided by 33,000 multiplied by 1.5, multiplied by 5.2, multiplied by 1.25, to which add 1.5). With this arrangement the outside fan could be used with or without the booster.

The fan in Fig. 4 at 80 percent efficiency will require 30.25 hp. (96,000 divided by 33,000, multiplied by 1.6, multiplied by 5.2, multiplied by 1.25).

We then have 80.2 hp., 63.0 hp. and 30.25 hp. for the three plans. The power cost for one year, continuous running power at 1.5c. per kilowatt-hour and a 20 percent allowance for belt and motor losses, would be:

80.2 divided by 1.34, multiplied by 1.2, multiplied by 24, multiplied by 365, multiplied by 0.015, or $9,437 with one fan and unbalanced splits.

63 divided by 1.34, multiplied by 1.2, multiplied by 24, multiplied by 365, multiplied by 0.015, or $7,414 with outside fan and booster.

30.25 divided by 1.34, multiplied by 1.2, multiplied by 24, multiplied by 365, multiplied by 0.015, or $3,560 with one fan and new intake on the right split.

The approximate saving in power per year with the booster is $2,023.

The saving in power per year with the new intake on right split is $5,877.

If the outside fan is less than 80 percent efficient, the annual power cost will be higher, and the addition of an efficient booster, a second outside fan, or a new inlet will mean a greater saving.

If a new air shaft intake for 50,000 c.f.m. is to be sunk in sandstone strata requiring no lining, and the material can be taken out through the mine workings, it will pay to consider a 12-in. drillhole to the coal, enlarging it by dropping the material through the hole into a chute to mine cars. The drillhole will provide ventilation and drainage, reduce the cost of shooting and handling the surrounding rock, and men can work with greater safety, as rock will not be hoisted in the shaft. With air at 1,000 f.p.m., an 8-ft.-diameter shaft will provide 50,000 c.f.m. If the sides are trimmed up fairly well we may use a coefficient of friction of 0.00000001, and for a depth of 100 ft. we have a resistance, without allowance for turn at the shaft bottom, of 0.5 lb., or about 0.1 in w.g. (p equals 0.00000001, multiplied by 100, multiplied by 25, multiplied by 1,000, multiplied by 1,000, and divided by 50).

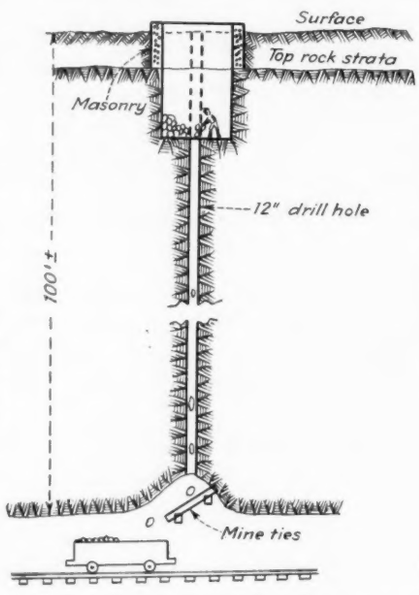

Fig. 5—Showing diagrammatically shaft sinking with pilot drillhole.

Shaft Cost May be Low

Under favorable conditions, the cost of a 12-in. drillhole, 100 ft. deep in standstone, should not exceed $900, allowing about one-third for transporting the drill. The cost of drilling, shooting and putting the rock into the drillhole to enlarge the hole to a diameter of 8 ft. should not exceed $600. For a minimum diameter of 8 ft. we may allow about 15 percent for excess yardage. Thus, we will have about 400 tons of rock to remove in mine cars, for which we may estimate $200. Some timber or concrete lining might be required, but under favorable conditions a suitable shaft may be provided for $2,000, and in this example it would pay for itself in about four months. This method of shaft sinking is outlined in Fig. 5. It was used by the author for a 200-ft. air shaft with excellent results some years ago. Timbering and chute are necessary at the bottom to prevent damage to mine cars. Material is heavier than coal, and cars should not be overloaded.

A 36-in. hole may be drilled in rock with a rotary core drill. After drilling several feet in sandstone a man is lowered into the hole. He makes a hole and puts in an eyebar for hoisting the core. It is necessary occasionally to put in a small shot to break the bedding plans. Machines for larger diameters will be made if there is sufficient demand.

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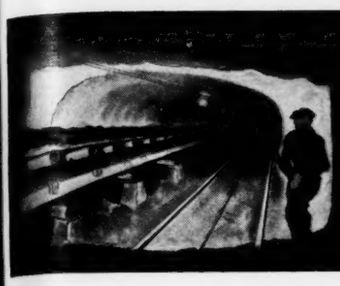


THE FOREMEN'S FORUM

British Safety Men Seek New Ways to Make Explosive Gases and Coal Dust Innocuous

Are Other Explosive Gases Than Methane Found in Coal Mines?—In Dry Dusty Mines Does Gypsum Make Best Dust?—Do Too Many Fines Make Rock Dust a Sluggish Fire Warden?—Longwall "Huggers"

DESPITE the war, the British are studying mine safety with vigor. Loss of life on the battlefield is no more costly than in the mines, and men are as much lacking to fill the working places in British pits as to fill the gaps in the embattled legions. However, the report of the Safety in Mines Research Board for 1941 has only just been issued.

Whether methane is the only explosive gas to occur naturally in the mines has long been debated here, though from mine fires and from chemical reactions hydrogen is evolved, from combustion comes carbon monoxide, and from gas and oil wells other paraffin-series gases as well as methane. But the S.M.R.B., in its 1941 report, has no doubts that British coal emits ethane as well as other higher paraffin hydrocarbons. This has occasioned some nervousness. It finds also that overfine particles in rock dust are like the finest of silts in water, difficult to disturb, as American investigators also have ascertained. Coal dust and rock dust, respectively the cause and cure of mine explosions, it declares, should be kept in close company for best results. Mysterious slips in coal faces that run back into the coal on 45-deg. angles or roughly parallel to the face have been found in British mines but seem to be reduced by speed in longwall advance and other means.

Ethane and Other Heavier Hydrocarbons in Firedamp—Several instances of firedamp containing notable quantities of a paraffin hydrocarbon other than methane have been found lately. Three samples of gas out of five, taken in different pits, where sheathed explosives have been under suspicion as sources of ignition of firedamp, were found to contain higher hydrocarbons which, calculated as ethane, amounted to from 4 to 9 percent of the firedamp. A sample large enough for a more thorough analysis therefore was collected in one of the pits by a special apparatus so constructed that none of these hydrocarbons could be absorbed in either collection or transit. An analysis by chemists of the Anglo-Iranian Oil Co. showed: methane, 90.15; ethane 3.15; propane and heavier hydrocarbons, 0.65; nitrogen, 5.85, and oxygen, 0.20.

Such small quantities of other hydrocarbons, declares the Board, are not in themselves a cause for concern; for, besides the knowledge that small quantities of them do not affect the ignitability of methane to an important extent, there is direct evidence in that the tests of mining explosives and electrical "gear" (equipment) are made in explosive atmospheres which are made by adding to air a natural gas which is methane containing about 3 percent of ethane. It would be helpful, says the report, if anyone finding evidence of firedamp containing more than about 5 percent of higher hydrocarbons would inform the Board so that the matter may be investigated further.

[Comment on the characteristics of the hydrocarbons of the paraffin series (C_nH_{2n+2}), of which methane (CH_4) is the first and only saturated member, might here be interjected. The apprehension about the heavier of these hydrocarbons is natural (1) because they ignite at a much lower temperature than methane, and (2) do so more promptly (with a shorter time lag) and (3) because there is a possibility that they will segregate like carbon dioxide, as propane is almost as heavy as that gas and butane is much heavier. They make hotter flames than hydrogen, and they produce more energy per cubic foot. Also they appear to require less oxygen, and therefore less air, than hydrogen and methane, but that is not quite clear, for the quantity needed does not have a direct relation to the quantity entering into combination with the carbon and hydrogen but depends on the quantity needed to permit of combustion. Hydrogen combines with 8 lb. of oxygen, methane with 4 lb., and octane with only about 3.5 lb. of oxygen per pound of the respective gases when burned. Pentane, hexane, heptane and octane are liquids at normal temperatures and pressures.

[Tests for permissibility of mine equipment are made in the United States with natural gas having more higher hydrocarbons than the gas used in Great Britain: 10.8 percent of ethane (Bull. 346, p. 55), even almost 17 percent (Serial No. 2434, p. 4). Thus our permissible explosives and equipment have an even greater mantle of protection against ethane than those in Great Britain.

[Nevertheless, the thought perhaps may be pardoned that by reason of segregation there may be local atmospheres in the mine with more ethane and propane than the Board found. There is a talk of "quick gases" that disdain the meshes of the safety lamp. Such hydrocarbons may be in excess in places in the coal also, for methane may escape and leave the heavy gases behind.

[As has been said before in *Coal Age*, it seems likely that these gases will be found where oil drips from the mine roof and where there is an abundance of oily shales. As they have been found in Great Britain and Germany, we cannot be sure they are never to be found here. All the figures in the table must be accepted with some caution. Authorities give quite widely divergent information, which is to be expected because the hydrocarbon gases, at least in some cases, are obtained by fractionation which does

CHARACTERISTICS OF HYDROGEN AND OF MEMBERS OF THE PARAFFIN SERIES OF HYDROCARBONS

Gas or Liquid	Formula	Heat of Combustion Kg-Cal *	Ignition Temperature Deg. Centigrade *	Specific Gravity	B.T.U. per Cu.Ft.	Oxygen Content Below Which No Moisture Is Flammable†
Hydrogen...	H	.....	1075–1100‡.....	0.0695	318.8	5.0
Methane...	CH_4	210.8	736 with 6.5% in air...	0.5534	995	12.1
Ethane.....	C_2H_6	368.4	560 with 4.05% in air...	1.0371	1731.92	11.0
Propane....	C_3H_8	526.3	525 with 4.90% in air...	1.5210	2465	11.4
Butane.....	C_4H_{10}	683.4	502 with 4.85% in air...	2.0047	3204	12.1
Pentane....	C_5H_{12}	838.3	486 with 5.30% in air...	liquid	.....	12.1
Hexane....	C_6H_{14}	990.6	300 to 306 with 6.70% in air...	liquid	.....	11.9
Heptane....	C_7H_{16}	1149.0	285 with 6.70% in air...	liquid	.....	....
Octane.....	C_8H_{18}	1305.0	275 with 6.70% in air...	liquid	.....	....

* International Tables of Constants. † U.S.B.M. R.I. 3490, p. 5. ‡ Marks, Mechanical Engineers' Handbook, 2d ed., p. 1095.

FLAME TEMPERATURES AND IGNITION RANGES OF HYDROGEN AND HYDROCARBONS OF PARAFFIN SERIES

Gas or Liquid	Percent of Combustible	Flame Temperature * Deg. C.	Limits of Downward Propagation † Moisture Saturated Air			
			Lower	Upper	Size of Glass Tube, cm	Firing End
Hydrogen.....	31.6	2045	9.45	66.4	1.9 x 40	Closed
Methane.....	5.8	1875	6.10	12.8	1.9 x 40	Closed
Ethane.....	4.15	1895	4.05	9.55	1.9 x 40	Closed
Propane.....	3.2	1925	2.40	6.69	2 x 40	Closed
Butane.....	3.2	1895	1.92	5.50	2 x 40	Closed
Pentane.....	....	1900	2.4	4.9	1.9 x 40	Closed
Hexane.....	....	....	1.3	....	2 liter bottle	Open
Heptane.....	....	....	1.1	....	2 liter bottle	Open
Octane.....	....	....	1.0	....	2 liter bottle	Open
Nonane.....	....	....	0.83	....	2 liter bottle	Open

* Lewis and Von Elbe, p. 399. †"Limits of Inflammability of Gases and Vapors," Coward and Jones. Figures chosen are those that furnish comparative values as far as such values can be obtained. Lower low-limit figures than those given were obtained with larger tubes and for upward or horizontal propagation.

not afford an accurate separation of one hydrocarbon from another. With all the divergencies, they show marked trends that are highly significant.

[It has been explained by H. P. Greenwald, superintendent, Experimental Mine, that the difference between 10.8 and 17 percent in the percentage of ethane used by the U. S. Bureau of Mines represents the change over a period of eight years and that gas received at the Pittsburgh station differs from that used at the Experimental Coal Mine at Bruceton, for different companies serve the two places and the gas always has been somewhat different. The quantity of the higher hydrocarbons in natural gas has been found to vary with the time of year. If pipelines are near the surface and subjected to freezing weather during the winter, small quantities of the higher hydrocarbons may condense to liquids, to evaporate later and increase the normal quantity of gas as it comes from the ground. But these variations, Mr. Greenwald states, do not seem to influence the results of the tests made to determine the safety of explosives or of permissible electrical machinery].

Excessive Fine Material in Rock Dust Undesirable—With rock dust, the lower the percentage of particles below 10 microns in diameter (0.0004 in.), the greater the ease with which the dust is dispersed. Unfortunately, it is difficult to remove these small particles because they adhere to one another and to larger particles. Tests, however, are being devised to give a rock dust that will be more easily dispersed.

If the limestone has been ground without such methods of removal of undersized dust, the air current will fail to raise it unless its ventilating speed exceeds 4,800 f.p.m. A limestone dust, when intermittently ground and cycloned, will be lifted by an air speed of only 3,300 f.p.m. Straight-ground magnesium limestone rises to a gust traveling at 4,600 f.p.m., but when intermittently ground and cycloned it will rise when the air current travels at 2,000 f.p.m.

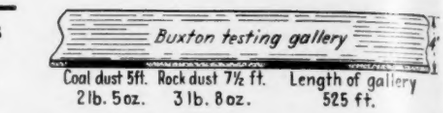
On the other hand, coal dust rises when the speed is 1,500 f.p.m. and so forms a cloud more rapidly than rock dust. Coal dust, which usually is on the top of the rock dust, and therefore is the more ready to rise, is 33 percent more nimble than properly ground magnesium limestone dust, which is expected to check it, so it has the start and is 3.2 times more nimble than straight ground limestone dust.

How to Test Rock-Dust Fineness—Estimation of sizes by sieving cannot hope to differentiate sizes below 50 microns (0.002 in.). The microscope is more effective but too slow for this purpose. Sedimentation is a less accurate means of separation, but the technique of Andreasen, where the dust is dispersed in a liquid and 10cc. samples are taken at given time intervals from a known depth below the surface is available for the purpose. All particles in a sample are assumed to be smaller than those which experiment has shown to sink below that level in a given time.

Dust in Loading Coals—Coal dust deposited near the belt rollers on the return half of a conveyor created a greater hazard than the dust deposited near the loading point because, although the dust from loading the belt is finer and the cloud it creates is very dense, more dust usually is deposited by the belt than escapes in the discharge of coal onto its surface. Sprays working under a water pressure of about 120 lb. per square inch and formed into a mist by compressed air at a somewhat lower pressure have been used to spray the coal entering cars. Ten ⅛-in.-diameter jets are located on a pipe bent to form a rectangle somewhat larger than the top of the car, so that a mist is projected on the coal from all directions.

Covering the top of a car with a hood is not favored by men at the loading point because they cannot well view the descending coal. More attention should be given to screening the back and sides of the car. A filter to prevent dust from entering the return has a series of metal plates zigzagged in the direction of air flow and equipped with a water-circulating system to wash away the deposited dust, thus insuring that the resistance to the flow of air will remain constant. The resistance is less than 0.25 in. water gage.

Distribution of Rock and Coal Dust Inefficient When Not Intimate—Experiments in the 4-ft.-diameter steel gallery at Buxton showed that when the rock dusts and Silkstone coal dust were laid in separate zones, more rock dust was necessary to prevent the continuance of flammation.



Section of 4-ft.-diameter gallery, illustrating an experiment in which proportion of coal dust to rock dust was 40 to 60 and dust was laid at rate of 7.5 oz. per foot of gallery.

In intimate mixtures of this coal with magnesian limestone, ordinary limestone and precipitated gypsum dusts only 57.5, 60 and 45 percent of rock dust were needed respectively for safety. When the dusts were laid in short zones, 72.5, 67.5 and 60 percent of rock dust was required. The percentage of two of the three rock dusts had to be raised numerically 15 percent, or from 26 to 33 percent proportionately, when the two dusts were separately located. A simple calculation shows that this corresponds to nearly doubling the quantity of rock dust per pound of coal dust.

In these experiments, conditions were relatively favorable to the dispersion of rock dust because the dusts were spread in equal weights per unit of length, so the exposed area of the rock dust was greater than that of the coal dust. The specific weight of rock dust is roughly twice that of coal dust, and the thickness of the deposit therefore was one-half. Had the rock dust and the coal dust been spread to equal thickness or over an equal area, still more rock dust, declares the Board, might have been needed to insure safety. A marked explosive concussion was provided which tended to throw the dusts into the air. What would happen, adds the Board, if a light concussion stirred the dusts less actively?

Gypsum vs. Limestone—The experiments described showed a pound of gypsum, though incompletely hydrated, was as effective as 1.8 lb. of limestone when intimately mixed with coal dust and as 1.6 lb. of limestone when the dusts were spread in separate patches. The Board adds that the high efficacy of gypsum is of value under conditions where it will not cake. [British mines are so deep and warm that the air always has necessarily an abnormally low moisture content, thus preventing the caking of the dust.]

Longwall Faces Develop Huggers—"Huggers," in Yorkshire parlance, are fracture planes in a coal seam which in many cases continue for some distance into the roof and floor. Some of these are at 45 deg. to the face line and intersect one another at an angle of about 90 deg. and others are roughly parallel to the face. They are not like natural slips. The slips that parallel the face when they coincide with breaks in the roof give bad roof conditions. That huggers are induced by mining is suggested by the reduction in their frequency which follows an increased rate of face advance, the strengthening of the packs and the use of chocks as face supports. The aim of these changes is to spread the load acting ahead of the face.

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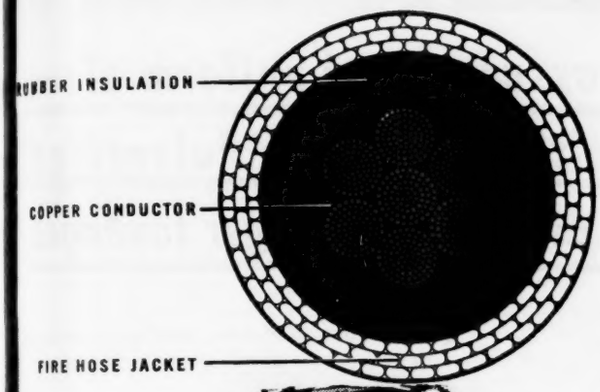

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TO HELP YOU *Produce Now* AS NEVER BEFORE

AMERICAN "AC" Type ROLLING RING CRUSHER

Get assurance of uniform sizes for either Stoker or Pulverized Coal as you crush larger tonnages

★ Huge tonnages of stoker coal will be required in 1943 as the speed of our victory program increases.

You can amply and economically provide for your CRUSHING requirements with the American Rolling Ring Crusher. It speeds up the work by staying on the job and by action of the crushing parts.

The crushing parts are: breaker plate, grinding plate, grate bars, and rings which weigh about 27 lbs., made of manganese steel. Centrifugal force is applied at right angles to a horizontal shaft. The rings roll as they grind. They are thrown back when they encounter non-crushable material, protecting the crusher from damage by foreign materials. This flexibility or "give" makes the crusher self-acting against tramp iron. Users have crushed hundreds of thousands of tons with no time-outs for maintenance and no repair or replacement costs.

You get greater range of reduction—uniformity of sizes—extreme simplicity of operation and a reduction in power requirements.

The American Rolling Ring Crusher is built in many sizes. Each unit is arranged to meet the particular requirements of each application—each is compact, externally adjusted, easily accessible.

Write us as far in advance of your crusher needs as possible to insure fastest delivery.

Why you get Splitting Action instead of Crushing

● Patented reversible manganese steel SHREDDER RINGS are found only in the American Rolling Ring Crusher.

The Rings have twenty cutting edges or teeth and are designed to maintain their outward position by centrifugal force at specific speeds. In contact with solid metal, the rings are momentarily deflected from their usual course, because they are free to swing back out of position. No shear pins or other safety devices that require attention.

Size 60S rated to crush 300 tons per hour of 6-inch lump down to ¾-inch.

AMERICAN PULVERIZER COMPANY 1119 MACKLIND AVENUE ST. LOUIS, MISSOURI

ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

STATE-BOARD QUESTIONS

Mine Foremen's Quiz, West Virginia

The following questions have been selected from those included in "The Mine Foreman's Guide," used as the basis for examinations in West Virginia. The answers given in the guide, which normally are quite brief, have been supplemented by comments and data, which the editors of COAL AGE *hope will be of assistance to those interested in these subjects. The numbers given the questions in the guide follow each in parentheses thus (Ventilation, 128, etc.).*

Check Curtains

Q.—What is the purpose of a check curtain? (Ventilation, 128)

A.—To deflect the air current from headings into working faces.

[A check curtain is used to compel the air in a heading, or a part of it, to leave the heading and travel to a working face. In earlier days, the air traveled almost exclusively in headings and very little went into rooms, so today check curtains (A, Fig. 1) are hung in the headings to stop the air from traveling in that direction, and the air naturally tries to get around the obstruction by detouring through the rooms. If the crosscuts in the room are closed or the side of the room is full of gobbed rock, clay or partings, the air finds it easier to travel to the face than to short-circuit through the first or second crosscut.

[Usually the check curtain is hung just to the leeward of the first room in a heading, and the air goes up this room. The pillar between the first room and the face heading usually has no crosscuts and, if there were, they would do no harm, and if all the crosscuts in the other rib except the last are curtained—B_1, B_2—or provided with stoppings, the air will get to the end of the first room, *C*, and, having traveled that far, will continue at the faces of the rest of the rooms until it arrives at the last one, *D*, where it will be obliged to return to the heading.

[A very dangerous condition exists where the heading is well ventilated with good intake air and the room has an explosive methane mixture. Suppose a small ignition of gas occurs in the room. The explosion may not be very violent because of the low oxygen content, but, when the burst of flame gets to the heading, the fresher air there gives the most favorable condition for a big explosion. It is in the rooms that the air is most greatly needed and there most of it should go, for the rooms contain most of the methane and most of the floating coal dust and there, perhaps, ignitions of methane are most frequent.

[So, the check curtain is desirable and even essential but it has its faults:

[(1) It may be so stiff as to dislodge a motorman from his locomotive and cause an accident, perhaps a fatality. It may do much the same for a trip rider. (2) It may catch fire and so be a hazard, though, of course, it should be fire-resisting, but the permanence of that resistance is doubtful in some cases. (3) It may be torn down and fail to effect its purpose. (4) It will screen men traveling on the road from the view of the motorman and hide the approach of the locomotive from the men; in consequence, men may be run down and injured or killed. The use of the gong is quite necessary near a curtain, but, if the man on the road is deaf or slow to respond to the warning, an accident may occur. (5) The motorman may fail to see a closed switch. (6) The trip rider may have to leave the trip to hold open the curtain and in jumping off the trip, running ahead of it, holding the curtain open and remounting, he may be injured. (7) The curtain may be caught by the trip and torn down with possibilities of derailment and hernias in replacing cars, etc.

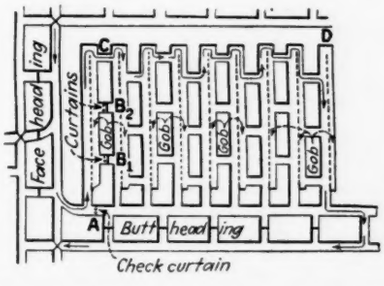


Fig. 1—Check curtain at *A* diverts air through nine rooms.

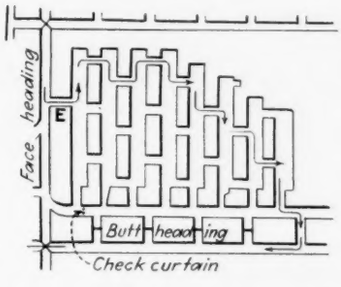


Fig. 2—A croscut at *E* aids in the entry of air to rooms and may make check curtain unnecessary.

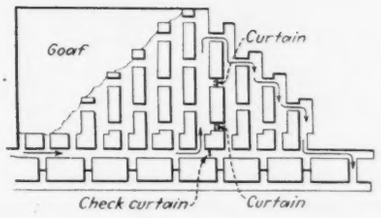


Fig. 3—Check curtain has been advanced to beyond eighth room to ventilate advancing rooms.

[A foolproof and fireproof automatic check curtain should be devised, as it is greatly needed and all the crosscuts but the last in the room up which the air is diverted might well be provided with curtains nailed to a frame set within them. When a crosscut to the face heading—*E*, Fig. 2—is available (presuming this is a butt heading) it will make an excellent approach for the ventilating current until pillars are drawn, after which, in any event, the check curtain in the butt heading, as the rooms cave in, will have to be advanced to a point, Fig. 3, beyond the room then about to be drawn.]

Thermometric Conversion

Q.—How is a reading on the Fahrenheit scale converted to one on the Centigrade scale? (Instruments and Apparatus, 34)

A.—Centigrade = 5 (F. deg. −32 deg.) ÷ 9.

[Fahrenheit set the freezing point of water at 32 deg. and the boiling point of water 180 deg. higher or 32+180=212 deg. whereas Celsius, who gave us the Centigrade scale, put the freezing point of water at 0 deg. and its boiling point at 100 deg., so the Fahrenheit scale has 180 deg. between freezing and boiling of water and the Centigrade scale has an even 100 deg. The Fahrenheit degrees must therefore be smaller than the Centigrade degrees because there are more of them in the interval between freezing and boiling than there are Centigrade degrees. The ratio between them will be 180 to 100 or 9 to 5 (see Fig. 4).

[When the Fahrenheit temperature is

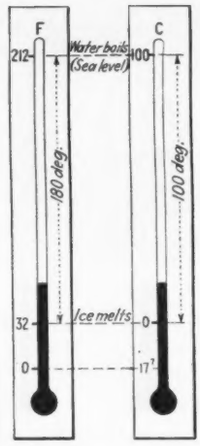


Fig. 4—Fahrenheit and Centigrade thermometers compared.

given, subtract 32 deg. from it to get the number of degrees above the freezing point, which latter is the zero on the Centigrade scale. Then, multiply the number you get by 5/9, and you get the number of Centigrade degrees which corresponds to the number of Fahrenheit degrees, and you have the answer. Thus, if you take the temperature of a shallow mine, 62 deg. F., and take 32 deg. F. from it, you have 30 deg. F. above freezing. Then you multiply 30 by 5/9 and you get 16.66 deg. C., which is what you want. That may be more easy to remember than the equation Centigrade = $\frac{5}{9}$ (F deg. − 32)].

Soft Cap Pieces

Q.—How does a cap piece protect a prop? (General Mining Practices, 270)

A.—It takes the first weight by crushing without affecting the strength of the prop.

[The purpose of a prop is to hold the drawrock or under rock up to the level to which the top rock will descend. Drawrock tends to leave the top rock and to sag so much that it breaks, and the prop is provided to hold the drawrock in place, but, if post and cap piece try to do more and hold up the top rock, the prop will break by bending or be split by direct pressure, and then it won't hold up the drawrock any more.

[So the best plan is to use a softwood cap piece over the timber, and this will crush, leaving the prop almost unbent and certainly unbroken. In longwall even a cast-iron post of large cross-section may be broken, and wood can stand much less load.

[Top rock usually comes down in a room only a trifle, so the crushing of the cap piece suffices to let it sag that distance, and, having dropped that far, the top rock does not show any disposition to go much farther until pillars are being drawn. Use the softest cap pieces in the center of the room, for that is where the roof "bellies down" the farthest, especially in the center of the span between the butt heading and the face of the room. Sometimes a variety of cap pieces are supplied, some thicker and some softer than others. For the midspans endwise and across the room use the thicker and softer woods, which will permit the top rock to descend with minimum resistance.]

Fireboss-Assistant Foreman Examination State of Washington

Q.—Explain the constant "5.2" used in water-gage calculations. What will be the reading of the water gage when the pressure is 20 lb. per square foot? When you obtain your answer, say whether, in your opinion, the ventilation in a mine with such a pressure is efficient or uses too much power?

A.—The constant area of "5.2" is the weight of a body of water 1 in. deep covering an area of 1 sq.ft. When the pressure is 20 lb. per square foot, the gage reading is obtained by dividing 20 by 5.2, which equals 3.84 in. In reply to the second part of the question, too much power, apparently, is being consumed at this mine for ventilation, for under most conditions such a high water-gage indicates an excessive velocity of air through the passageways, which in turn disposes one to believe that they are of insufficient area, filled with water, cluttered with rock and timber, of irregular contours or needlessly long. Consequently, a revision of the ventilating system should be considered.

Q.—Should you become a supervisor, what would be your attitude toward those under you?

A.—I would insist on a good day's work from every man, maintain necessary discipline, and endeavor to train all the men so that they would perform their duties with such coordination as would promote maximum efficiency. I would, moreover, always bear in mind that they expect the same treatment from me as I would desire from them, if in their places. I would aim to lead them rather than become a driver or petty faultfinder, for to get such a reputation would certainly prevent smooth operation. I would not let personal prejudice against any individual influence my actions. In other words, I would be the leader of the men I would command, patiently directing and instructing them so as to obtain the best results, rather than a "crab" who would merely bewilder them and make them wonder what was desired. I would bear in mind that I also am largely responsible for the safety of the men in my charge. I would seek for and consider suggestions offered by those under my supervision.

Questions Anthracite Inspector Candidates Were Asked Sept. 2, 1942*

Q.—If, while making an inspection of a gassy mine, you were notified that a fire had occurred on a gangway about midway on the air split, explain how you would proceed to take care of the safety of the men who might be in danger.

A.—Usually, no opportunity is presented to insure the safety of the men behind the fire. They have either left by the intake, having found it possible to pass the fire at its inception, or have escaped some other way, either through the return, which, at the start, is not too badly polluted for such escape, or by passing through crosscuts (headings) from breast to breast and thus getting on the intake side of the fire. Frequently, there is no way even of notifying the men who may be in danger unless it be done speedily, so the inspector, who is notified in another part of the mine that the fire is already in progress, can do little about it, but an attempt should be made by men with gas masks or breathing apparatus to travel the breasts back of the fire.

However, if there is another way of escaping from the fumes of the fire or getting behind it to make an exploration with respiratory equipment, that should be done, unless all the men endangered have been accounted for already and every means should be provided to find out whether all the men so exposed have escaped.

All the men not fighting the fire should be removed from the mine until all stoppings in the passages and boreholes leading to it have been constructed, and no men should be admitted except those authorized to fight the fire.

Electrical Units

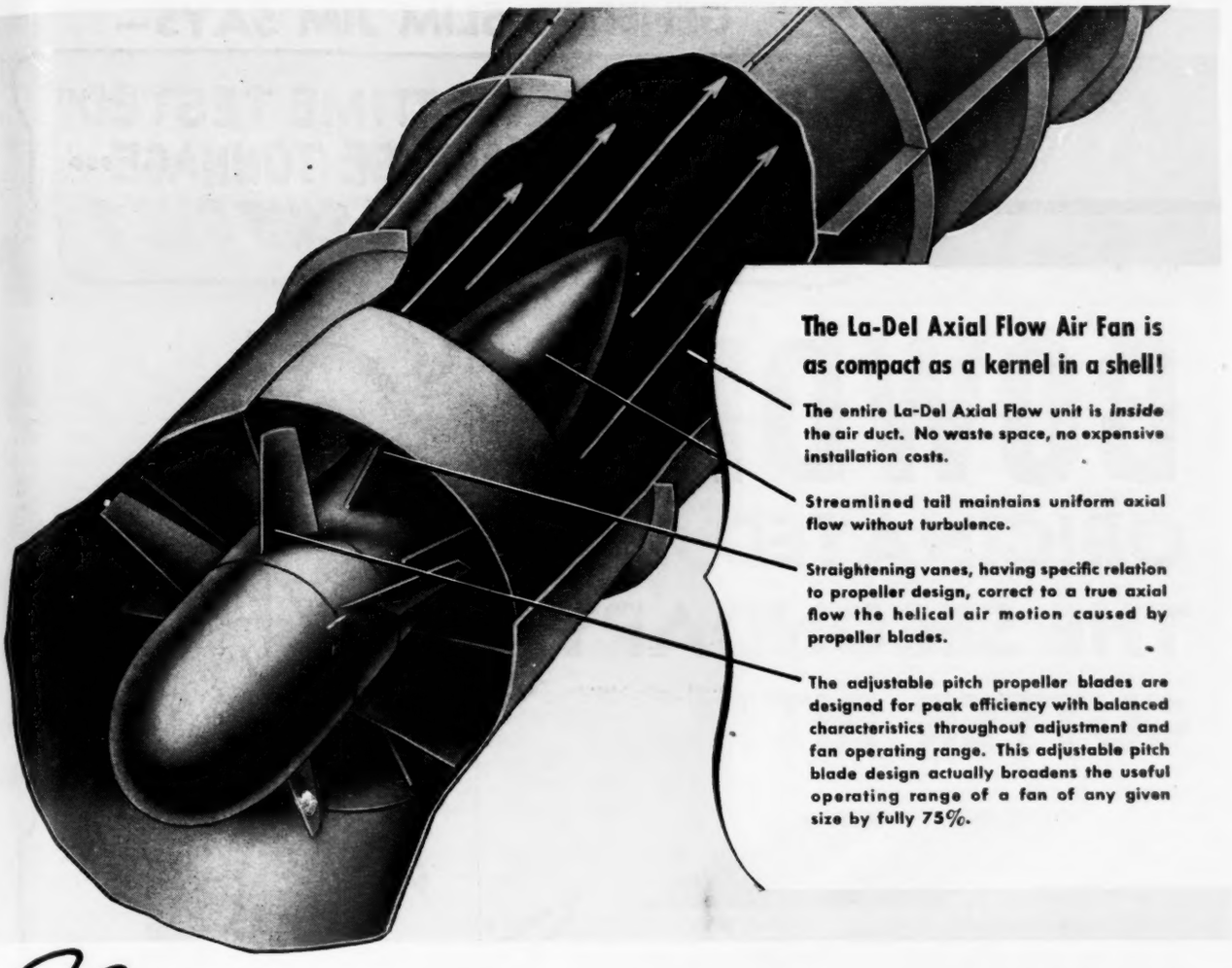
Q.—Define ampere, volt and ohm.

A.—Ampere is a unit of electrical current, or the current resulting when one volt of electromotive force overcomes a resistance of one ohm. Passed through a certain standard solution of nitrate of silver in water, one ampere will deposit silver at the rate of 0.001118 gram per second.

Volt is a unit of electrical pressure or electromotive force. It is 1000/1434 of the electromotive force of a standard voltaic cell of certain standard specifications and at a certain temperature.

Ohm is a unit of resistance. When an electromotive force of one volt forces a current of one ampere through a resistance, the measure of that resistance is one ohm. Where I = amperes, E = volts and R = resistance, I = E÷R.

* Continued from April, 1943, *Coal Age*, p. 75.



The La-Del Axial Flow Air Fan is as compact as a kernel in a shell!

The entire La-Del Axial Flow unit is *inside* the air duct. No waste space, no expensive installation costs.

Streamlined tail maintains uniform axial flow without turbulence.

Straightening vanes, having specific relation to propeller design, correct to a true axial flow the helical air motion caused by propeller blades.

The adjustable pitch propeller blades are designed for peak efficiency with balanced characteristics throughout adjustment and fan operating range. This adjustable pitch blade design actually broadens the useful operating range of a fan of any given size by fully 75%.

New . . . **SCIENTIFIC, SPACE-SAVING ECONOMY FEATURES**

YOU SHOULD KNOW ABOUT LA-DEL *AXIAL FLOW* AIR FANS

Study well the distinctive features of the La-Del Axial-Flow air movement system, as portrayed here. For this is the most modern and efficient of all air propulsion methods, destined to make possible new efficiencies and economies in all types of commercial, industrial and maritime construction!

The La-Del Axial-Flow air movement principle is a development of Dr. Troller, Director of the Guggenheim Airship Foundation, Akron, Ohio. Dr. Troller's research in the field of aerodynamics is well known to engineers throughout the world. La-Del Axial Flow Air Fans rapidly are becoming standard equipment for air movement in mines and naval vessels of all types. La-Del facilities today are devoted almost entirely to the wartime demands of the nation.

Write for Bulletin No. 116 giving additional facts about the La-Del Troller Axial-Flow air movement principle, for reference in the planning and construction of your peacetime developments.

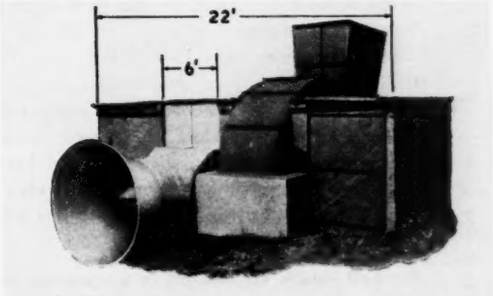


ILLUSTRATION OF LA-DEL SPACE-SAVING EFFICIENCY. Small dimension, 6 feet, dramatically indicates width of La-Del Axial-Flow Air Fan in contrast to 22 feet width of old, inefficient type of mine blower fan it replaced. Greater air-moving capacity, greatly lowered power costs, much lower initial costs, are important La-Del features.

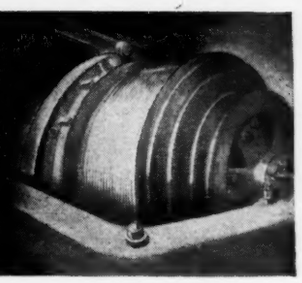
ARMY E NAVY — ENGINEERS OF LA-DEL AIR MOVEMENT

LA-DEL CONVEYOR & MFG. CO.

New Philadelphia, Ohio

PIONEERS IN THE DESIGN OF AXIAL-FLOW FANS FOR EFFICIENT AIR CIRCULATION

TIPS FROM MANUFACTURERS



Electronic Drive

For application on industrial drives, such as machine-tool feeds, winding reels, conveyors, and fabricating and converting machinery, a new electronic adjustable-speed drive, the Mot-O-Trol, announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is said to provide close speed regulation over a 20 to 1 speed range for d.c. motors operating from an a.c. source.

Features of the new drive include stepless speed control, automatic close speed regulation over wide load fluctuations, full torque at extremely low speeds, smooth stepless acceleration and deceleration and dynamic braking. At present, a standard drive is available for ratings up to 1 h.p. for single-phase operation on 110- or

220-volt 60-cycle systems. Special drives of larger horsepower rating can be designed to suit particular application requirements.

This new drive has four parts: (1) power transformer for separate mounting; (2) Mot-O-Trol cabinet with the thyratron tubes and the current-limiting and speed-regulating control; (3) control station with potentiometer to vary the voltage supplied to the armature and field circuits and with start and stop push-buttons, and (4) shunt-wound d.c. motor.

The standard Mot-O-Trol is designed to automatically regulate a preset motor speed so as to maintain essentially constant speed regardless of load. The d.c. voltage output of the main rectifier tubes is controlled by small tubes to compensate for speed changes. For a speed range of 10 to 1, with torque varying from no load to full load, speed will not vary more than 4 percent from a preset value. Maximum variation for the 20 to 1 speed range is within 8 percent. No additional rotating part other than the d.c. motor is required. No separate linestarters or field rheostats are necessary.

•

Electrode

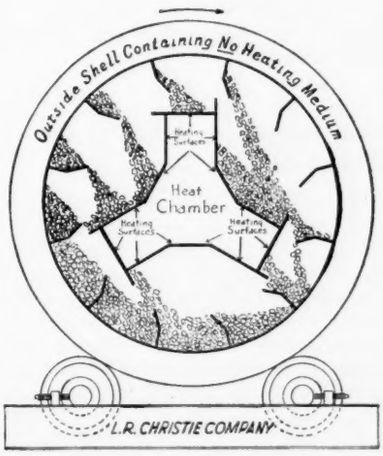
Tournaweld RW (Roller-Weld), specially developed for use in building up track rollers, rails and other similar parts of machines subjected to a combination of impacts and heavy bearing wear, is being introduced by R. G. LeTourneau, Inc., Peoria, Ill.

This new electrode is said to be characterized by rapid burn-off, smooth operation and uniform deposit of highly alloyed, tough, hard surfacing metal which is sufficiently soft in the as-deposited condition to be ground according to the best practice employed in rebuilding track rollers. It operates with greatest efficiency on reverse polarity with a d.c. welding machine. The rod is black and comes 14 in. long, in diameters of $\frac{5}{32}$, $\frac{3}{16}$ and $\frac{1}{4}$ in. It has been thoroughly field tested.

•

Revolving Dryer

In keeping with the trend toward economy fuel through the saving of heat, the L. R. Christie Co., New York City, offers a revolving semi-direct heat dryer which is said to accomplish this saving. Instead of placing the material in a central drum or cylinder and applying the heat through chambers or flues on the outside of this cylinder, this principle has been reversed,



the heat or gas being passed through a small drum or inclosed chamber which is rigidly suspended inside of and revolves with the large outer cylinder.

The material to be dried is placed between the outer shell of the dryer and the inner tube or chamber, allowing no heat to come in contact with the outer shell except as dry gases for picking up evaporated moisture. To provide maximum heating surface area for the material to be dried, the surface of the inner casing or chamber is shapped as shown in the diagram.

•

Eye-Protection Glass

Development of a new eye-protection glass—Didymium-Noviweld—which permits eyes of gas welders to pierce blinding glare and see welding operations from beginning to end, is offered by the Ameri-

can Optical Co., Southbridge, Mass. Lenses made of the new glass, it is said, cut down the high intensity sodium rays of the fluxes, enabling workers to look through the yellowish cloud of "flux-flare" and see the rod and the molten area clearly. The lenses also protect eyes by absorbing the harsh, tiring invisible ultra-violet and infra-red rays generated during welding. Three shades are available, Nos. 4, 5 and 6, corresponding with shade numbers of the standard AO Noviweld lenses.

•

Speed Control Equipment

A new unit in the line of variable-speed control equipment, the Reeves reducer-type transmission, is offered by Reeves Pulley Co., Columbus, Ind.

This drive consists of the standard

Reeves variable-speed transmission with built-in speed reducer combined in one compact completely inclosed unit, which is said to require less mounting space to obtain the lower range of speeds which formerly required the use of auxiliary speed reducing equipment.

Available in two inclosed designs—horizontal and vertical—which may be mounted in any convenient or desired position, each design may be had in a wide range of speeds and in capacities from 1 to 7½ hp. inclusive. The transmission in various sizes produces ratios of speed variation from 2:1 through 12:1 and the reduction gears provide ratios up to and including 6.9:1.

•

Post-Glover 50 Years Old

Post-Glover Electric Co., Cincinnati, Ohio, incorporated May 3, 1893, is observing the completion of 50 years in business. For the first 25 years the company was primarily a distributor of electrical equipment and supplies through the Middle West; for the last 25 years it has been engaged almost entirely in the manufacture of steel grid resistors for use in and by mines, mills and railroads throughout the United States. Officers of the company are: C. E. Nuckels, president; J. M. Van Winkle, vice president and secretary; E. A. Vosmer Jr., treasurer, and J. M. Thiem, general superintendent.

•

Fire Extinguisher Case

To reveal instantly any attempt to temper with fire extinguishers, American-LaFrance-Foamite Corp., Elmira, N. Y., has introduced a new inexpensive extinguisher case, known as the Tampless case. Constructed of non-critical, tough cardboard stock, it is said to house safely the extinguisher from the reach of unauthorized persons and yet allows of instant removal for legitimate use.

One quick pull on a sealed string breaks through a gummed paper sealing strip and permits the case to unfold. The extinguisher can immediately be lifted from its bracket. For reuse it is necessary only to reservice extinguisher, replace, fold case and reseal.

Precise information on the front of each case shows the classes of fire on which extinguishers should be used, and the kinds on which they should not be used. Clear, concise instructions also show how each extinguisher should be operated.

•

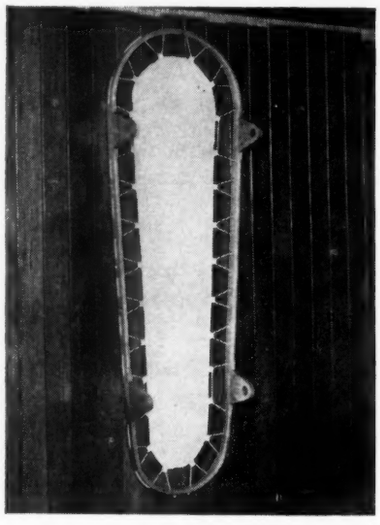
Paints

S. C. Johnson & Son, Inc., Racine, Wis., offers a new line of war-formula paints specially developed to replace its wax-fortified paints (for which certain raw materials are no longer available). The new products require no special preparation or care in application: they may be brushed or sprayed on. They may be used on old or new surfaces of wood, brick, metal or plaster. They cover from 400 to 600 sq.ft. per gallon, depending on surface conditions and application methods used. Drying time is uniform.

•

Stretcher-and-Cot

The Stretcher-Kot, said to be notable for its light weight, ease of handling, low cost and all-round emergency use as stretcher and cot, is offered by J. L. Schilling Sales Co., New York City. Its



frame, of specially selected ash, is 78 in. long, 25 in. wide at head end, 8 in. high and weighs less than 12 lb. The tapering design permits two units, one head first and one feet first, to be placed side by side in a station wagon. After treatment, a patient may be left on the Kot if conditions require. When not in use, the Kots can be hung on the wall, singly or in nests of two or three.

•

Heat Indicators With Dry Ice Protect Storage Coal

"Hot Spot" indicators, consisting of 15-ft. steel casings capped at the top and threaded at the bottom for fluted bronze tips for thrusting into the coal are recommended by Coal Specialties Co., New York City, for use to signal a temperature rise in storage coal piles. A chain of seven fusible links spaced 2 ft. apart and held under tension by a strong spring is inside the casing; each patented fuse "blows" at 150 deg. When a link so parts, the tension breaks and another spring forces up a plunger carrying the top cap, giving a signal visible 300 ft. away.

In cooperation with the Liquid Carbonic Corp., Chicago, Red Diamond brand dry ice is offered for cooling hot spots thus revealed in storage coal. The first step in the suggested treatment is to seal the coal pile to a height of several feet with wood, building paper, tar or any other satisfactory method of eliminating bottom draft. Then 3-in. pipes, equipped with a screw cap at one end and the other end cut and welded to a point are used to introduce the dry ice into the coal pile. A series of ⅜-in. holes are drilled into each pipe about 6 in. back of the point and another set of holes drilled about 1 ft. above the first set. The pipes, which should be about 15 ft. long, are sunk into the coal in a pattern around the hot spot. About 50 lb. of crushed dry ice should be inserted into each pipe to start with, and the screwcap replaced.

Carbon-dioxide gas, released in the evaporation of the dry ice, say the sponsors, makes its way out through the holes in the pipes and through the surrounding coal to smother effectively any flame. At the same time, it is said, the refrigerating qualities of the dry ice serve to cool off the hot spot. Crushed dry ice should be added into the pipes as needed until the hot spot is cooled.

•

Current Collection Problems Solved by Trolley Shoes

"It's mighty important today to obtain maximum life from all expendable metal materials which are necessary to mine operation," O-B Haulage Ways points out. "This is especially true with trolley wire and current collectors. O-B has always recommended trolley shoes as the best solution for most collection problems. And in view of the present wartime metal scarcities, we strongly urge that you consider this recommendation. Here are seven basic reasons why.

"*Longer Wire Life*—Coupled with an efficient lubrication program, shoe collection decreases wire wear considerably. Makes fewer wire replacements necessary.

"*Longer Collector Life*—Field tests and investigations have shown that under identical conditions trolley shoes will outlast wheels many, many times.

"*Saves Copper and Tin*—Since trolley shoes are made of steel, sizable quantities of copper and tin (used in wheel manufacture) may be released to the war effort.

"*Longer Wire Contact Surface*—A full 3 in. of contact between the shoe and the trolley wire prevents much of the arcing and wire burning caused by point contacts.

"*Fewer Dewirements*—Gliding smoothly over bumps and hard spots, shoe collectors stay on the wire. This characteristic may be demonstrated by comparing the smoother riding qualities of a sled to those of a spinning wheel.

"*Direct Current Connection*—A heavy braided cable shunt is used to bring current directly from the collector to the

WIRE ROPE IS THE LIFELINE

FROM PRODUCTION FRONT TO BATTLE-FRONT

Keep your wire rope doing its duty for the duration

Wire rope is as vital to winning this war . . . as are guns and ships and planes. For none of these fighting tools could be made or shipped or put into action so quickly without wire rope. Wire rope reaches back to the source of raw materials . . . hoists, pulls, moves them into production . . . swings the finished matériel on to ships . . . unloads it . . . puts it on the fighting line.

As a user of wire rope you can do your part by making every length of rope last and last. And this you can do by care . . . extra care . . . unceasing care. Your regular source of supply is ready to give you helpful information on how to get maximum ton-miles of service from your wire rope.

HOW TO MAKE YOUR WIRE ROPE LAST LONGER

Select the right rope for the job

1. Get the proper construction
2. Be sure the size is right
3. Specify the right lay
4. Allow ample safety factor

Install wire rope properly

1. Unreel rope correctly
2. Wind rope on drum properly
3. Do not allow rope to kink
4. Fix adequate clamps properly
5. Reeve rope through sheaves and blocks carefully
6. Seize rope-ends thoroughly

Be diligent in maintenance of wire rope

1. Inspect ropes regularly and carefully
2. Inspect sheaves and bearings often and thoroughly
3. Check rope lubricant frequently
4. Clean ropes regularly
5. Avoid impact or shock loads

JONES & LAUGHLIN STEEL CORPORATION

WIRE ROPE DIVISION

PITTSBURGH AND MUNCY, PENNSYLVANIA

J&L STEEL

motor cable. This eliminates the resistance and harmful heating attendant with 'axle and clip' collection.

"*Full Load Capacity*—With a full 3 in. of contact between the shoe and the wire, trolley shoes can draw sufficient current to accommodate the heaviest loads"

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Industrial Notes

WESTINGHOUSE AIR BRAKE CO., Pittsburgh, Pa., is engaged in development work on new remote pneumatic control systems, supplemented when necessary by the adaptation of pneumatic-hydraulic and pneumatic-electric controls, for use in the general industrial field. The work is being done by the engineering staff of the company at Wilmerding, Pa.

WESTERN MACHINERY CO. has established resident representatives in New York City and in the Chicago area. Herman Daniels will head the New York office, at 50 Church St., and Charles Skinner will serve as traveling representative in the Midwest. A. E. Chapin will represent the company in Washington, D. C., with office at 823 Colorado Building. Mr. Daniels has had extensive engineering experience in the coal-mining fields.

ATHEY TRUSS WHEEL CO., Chicago, has promoted Ben F. Lease, formerly manager of service and research, to domestic sales manager. He started with the company in 1931.

EIMCO CORP., Salt Lake City, Utah, announces establishment of an additional complete filtration laboratory in connection with its Chicago office, 111 West Washington St. The filtration engineering staff has been enlarged with Paul Richter in charge of the filtration equipment department, vice C. J. Peterson.

STORAGE BATTERY DIVISION OF PHILCO CORP., Trenton, N. J., has been awarded a white star to add to its Army-Navy "E" flag.

LINK-BELT CO. has elevated Frank S. O'Neil, general manager of the company's Indianapolis operations, to the post of vice president. Vice president James S. Watson, Indianapolis, who has rounded out 50 years of service, will retire at the end of this year from active duty, but will continue as a director.

FOOTE BROS. GEAR & MACHINE CORP., Chicago, has been awarded the Army and Navy "E."

KENSINGTON STEEL CO., Chicago, has been awarded an Army-Navy "E" pennant.

SKF INDUSTRIES, Philadelphia, elected the following officers at a meeting of the board of directors: Thomas W. Dinlocker, vice president and treasurer; Richard H. DeMott, vice president in charge of sales; C. P. Collins, secretary. William L. Batt, vice chairman of the War Production Board, retains the presidency.

ELECTRIC STORAGE BATTERY CO., Philadelphia, has been awarded the second star on its Army-Navy "E" pennant, symbolizing six more months of production for the armed forces.

ROLLER-SMITH CO., Bethlehem, Pa., has appointed Roy M. Smith as chief engineer. He joined the company in August, 1942, as assistant chief engineer, and succeeds J. D. Wood, resigned.

COPPERWELD STEEL CO., Warren, Ohio, has opened a new sales office at Indianapolis, Ind., with M. A. Williams as district sales manager, with offices in the Circle Tower. The territory will include central and southern Indiana, southwestern Ohio and all of Kentucky.

INDEPENDENT PNEUMATIC TOOL CO., Chicago, has elected Neil C. Hurley Jr. as executive vice president. He has been with the company for eleven years, the last four as vice president and director. John A. McGuire has been elected secretary and E. R. Wyler has been named vice president with headquarters in New York City.

THOMAS LAUGHLIN CO., Portland, Maine, received the joint Army-Navy production award April 26 for outstanding production of wire rope and chain fittings for Navy and Merchant Marine ships.

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A. Reamy Joyce Passes

A. Reamy Joyce, 59, district sales manager, Wood Preserving Division, Koppers Co., with headquarters in Marietta, Ohio, died April 7 at the Memorial Hospital, Marietta, after a brief illness. He attended the U. S. Naval Academy for 2½ years and was graduated from the University of Minnesota in 1905. He then worked four years in sales for the American Radiator Co. and 24 years for the Joyce-Watkins Co. before joining Koppers in 1933.

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Trade Literature

CENTRIFUGAL BLOWERS AND EXHAUSTERS—Roots-Connersville Blower Corp., Connersville, Ind. Bulletin 120-B-12 covers both single and multi-stage units in many sizes. It tells the advantages inherent in the centrifugal design and discusses operating characteristics, with curves. Various control devices which provide suitable regulation are described.

CRANES, DRAGLINES AND SHOVELS—Link-Belt Speeder Corp., Chicago. Catalog 1960 covers 2- to 3-yd. Speed-o-Matic Series "500" cranes, draglines and shovels. These machines incorporate Speed-o-Matic hydraulic control, hydraulically controlled steering and braking, self-aligning rotating rollers, perfect-guiding non-clogging crawler treads with perfectly aligned rigid drive end and interchangeable crawler side frames. Dimensions, clearance diagrams, working ranges, lifting capacities and brief specifications are given.

ELECTRIC TOOL MAINTENANCE—Independent Pneumatic Tool Co., Chicago. Booklet JE-199 contains brief but complete instructions on the proper operation and care of all types of portable electric tools. Special attention is given to the more common and simple problems in maintenance of the motor, cable, switch and brushes. "Right" and "wrong" operating methods are clearly stated and pictured with simple instructions.

EXPANSION-BOLT CHART — Rawlplug Co., Inc., New York City. Broadside describes a 14x20-in. handy ready-reference wall chart covering expansion bolt and screw anchor dimensions. One of these charts will be sent to any user of expansion bolts requesting it on his business letterhead.

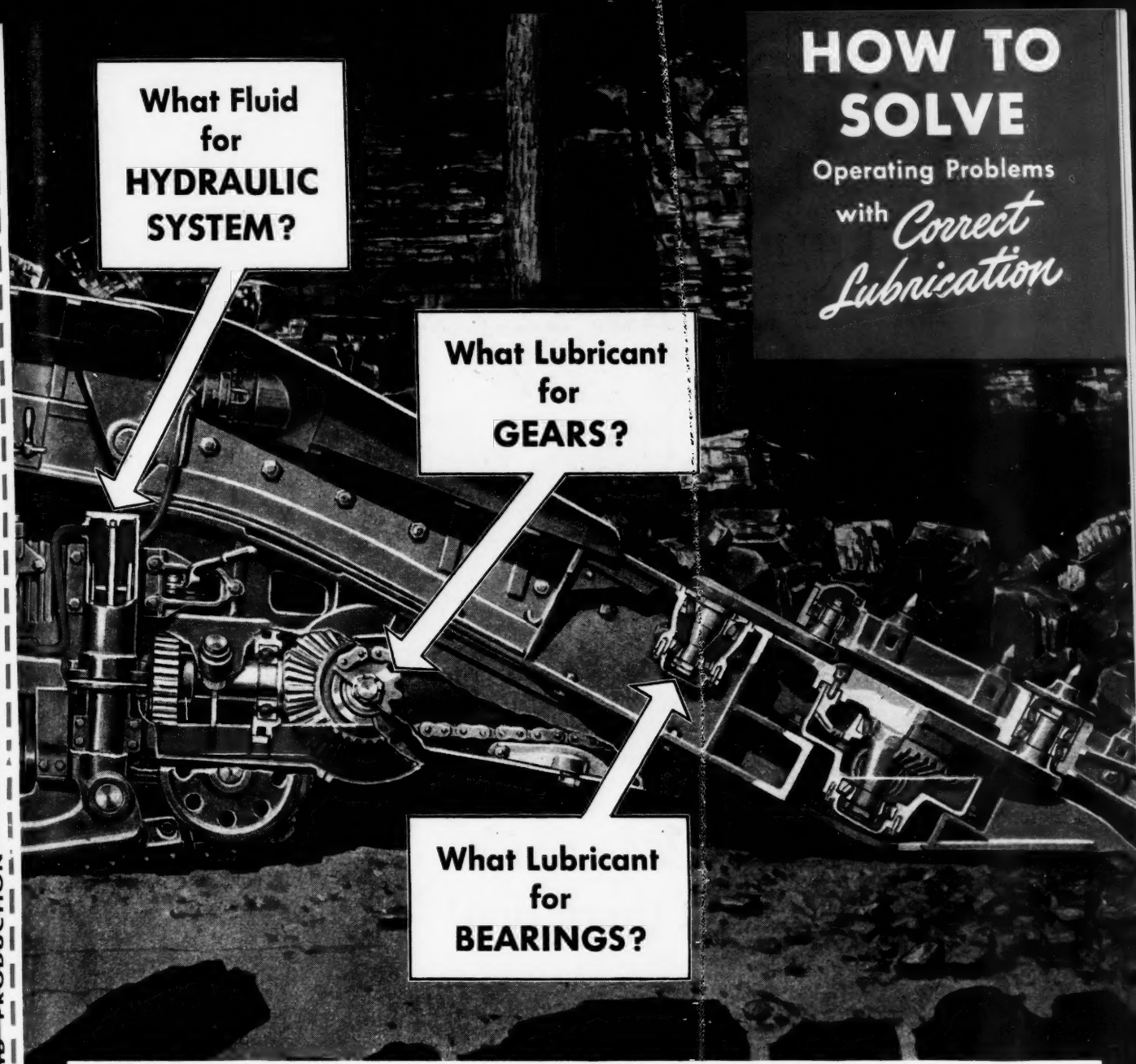
FIRE EXTINGUISHERS — American La-France-Foamite Corp., Elmira, N. Y. Booklet entitled "Maintenance of First-Aid Fire-Fighting Equipment," divided into six sections: (1) Vaporizing Liquid; (2) Soda Acid, (3) Foam, (4) Anti-Freeze, (5) Carbon-Dioxide Extinguishers, (6) charts giving complete data in condensed form as to extinguisher and engine characteristics, methods of operation, capacity, range of stream, etc., discusses inspection, upkeep, charging, discharging and recharging.

HARD-FACING METALS—Coast Metals, Inc., Canton, Ohio. Bulletin briefly outlines the many advantages of hard-facing in restoring worn parts of equipment to original dimensions by means of a welded overlay of wear-resistant alloy.

SAFETY EQUIPMENT — Chicago Eye Shield Co., Chicago. Catalog describes a wide range of industrial safety equipment providing protection for the head, eyes, nose, throat, lungs and other parts of the body. Included are various types of protective lenses, goggles, welders' helmets and shields, respirators, masks, grinder guards and toe guards.

TRACK CUTTER — Sullivan Machinery Co., Michigan City, Ind. Bulletin C-10 describes the Sullivan 7-AU track cutter, a "Universal" coal cutter with long "reach," said to give high tonnage and low costs. It will cut a room 39 ft. wide, drive a 20-ft. room with ribs parallel to the track, or make horizontal cuts from 10 in. below rail to 7½ ft. above rail. It cuts anywhere in the seam, shears ribs, center or angle shears, slab cuts or slab shears; and it eliminates need for track near the face.

WORM GEARS—DeLaval Steam Turbine Co., Trenton, N. J. Leaflet E-1219 describes worm gear units for 3- and 3½-in. center distances. These gears are supplied for either top or bottom drive and in ratios from 3⅝ to 1 up to 60 to 1 and are intended particularly for the operation of low-power machinery, such as small mixers, dryers, automatic furnaces and ovens, conveyors and elevators, mechanical stokers, etc. The lower ratios can be used as speed-increasing gears where the maximum worm speed does not exceed 1,750 r.p.m.



HOW TO SOLVE

Operating Problems with *Correct Lubrication*

Your Problem Is Different!

JUST A THOROUGH knowledge of lubrication principles isn't all you want from us by a jugful! You want *specialized* advice that can come only with a full understanding of *coal mining* operation problems.

You'll find that the Socony-Vacuum representative who calls on you is a seasoned counselor in lubrication and one who can well understand *your* particular problems.

For coal loaders like the one above, for example, he's equipped to recommend lubricants which combine assurance of continual loader operation with true economy of oil cost.

You want to *keep* your loaders at the face. Let the Socony-Vacuum man help you do it!

GARGOYLE Lubricants

SOCONY-VACUUM OIL COMPANY, INC. — Standard Oil of N. Y. Div. • White Star Div. • Lubrite Div. • Chicago Div. White Eagle Div. • Wadhams Div. • Magnolia Petroleum Company • General Petroleum Corporation of California

CALL IN SOCONY-VACUUM

ROEBLING *"Blue Center"* helps 'em get there first!

Pushing stubby assault boats ashore, through withering enemy fire, storming the beaches and mopping up enemy strong points—advancing inland to take and hold strategic airports, towns, road and railroad junctions—there is more to a successful invasion than these stirring deeds of U. S. fighting men in North Africa. To make that invasion possible, to make it *stick* till all objectives are fully attained, takes the brains and brawn of thousands of men who may never get to see the fighting at all—sailors on escorting warships, seamen on transports, dockworkers and stevedores to load and unload thousands of tons of equipment and supplies. It is these men and their ships *and their rope-equipped machinery* that make up the physical basis of *logistics*—the art and science of getting there first with the most and *staying longest!*

It's a tough job, meeting all the needs of a sizeable army in the field against a powerful enemy. Army Engineers and special stevedore units, Navy crewmen, merchant seamen—all of them swing to with a will. And they keep the ammunition coming for men and guns. In many of these places where the going is tough today, Roebling "Blue Center" Steel Wire Rope is in there swinging. Bringing to this tough job too the extra values built into it by Roebling Engineers out of their experience in the field—in Roebling's mills—in Roebling Development Engineering. Meeting unfailingly all the demands of Victory.

ROEBLING
"Blue Center"
STEEL WIRE ROPE
PREFORMED OR
NON-PREFORMED

YOUR ROPE LOGISTICS . . . GET THE MOST OUT OF IT!

You can do a lot to save steel by observing simple precautions in the installation and handling of wire rope, and help conserve rope for use by our fighting men. To make the job even easier, Roebling has prepared a handy tag—yours for the asking—to fasten right to your machinery where it'll do the most good. Our nearest office will gladly supply you with as many as you need. Ask for Tag "A".

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
Branches and Warehouses in Principal Cities

TIMELY OPERATING IDEAS

Scrap Materials Assembled Into Profitable Dump

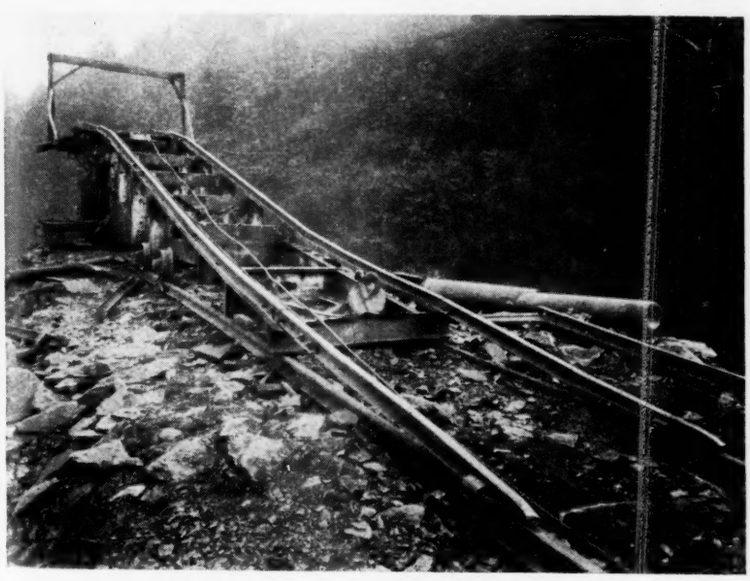
In dumping slate and mine rock at the Harlan Central Coal Co., Totz, Ky., considerable labor is saved and the operation made much safer by a semi-automatic movable slate dump designed and built by L. G. Coffey, chief electrician. As indicated in the illustration, this dump is a track-end unit for lift-endgate cars.

Including the ramp, the outfit is 40 ft. long and the horn rails are 8 ft. above the haulage track. The machine is mounted on eight car wheels (a pair of trucks under the front and a pair under the rear) and built into it is a small Lidgerwood single-drum friction hoist driven by a General Electric 15-hp. 230-volt crane-type d.c. motor. The drum controller and hoist friction lever are on an operator's platform, extending 5 ft. out to the side from the rail. Track gage is 44 in. The slate and rock loadings of the cars average close to 5 tons.

The dump is termed semi-automatic because no one is needed on top, at the car, when it is being dumped. This method of operation is possible because the hoisting rope is attached to the car by being carried underneath and hooked to the back bumper. After the car has been pulled onto the horns it tips when the hoist friction is released to pay out enough cable to let the rear end of the car rise. After emptying is completed the hoist friction is tightened to pull the rear end of the car down, then released to allow the car to drift back and take the rope with it.

For safety the rear wheels of the dump normally are chained to the track rails. A snatch block, which in the illustration can be seen at the rear end of the dump, is used to move it forward by attaching the rope hook to the front end of the haulage track. This dump was built last year when new structural steel already was a scarce item.

Therefore parts of an old discarded tipple were utilized in its construction.



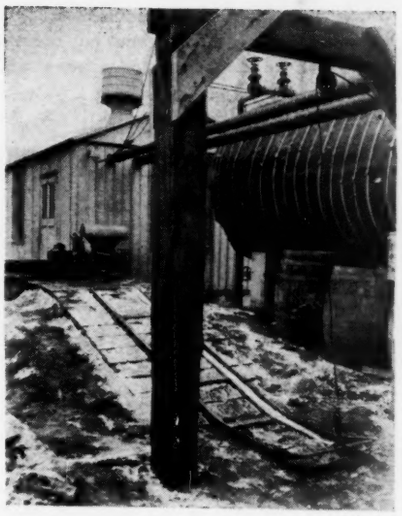
Affords cheaper and safer dumping of mine rock.

•

Hinged Track and Winch Form Barrel Lifter

Simple and effective is the barrel hoist used at the mixer for the liquid agent applied to the coal as a dustless treatment at the new prepartion plant of the Consolidation Coal Co., Jenkins, Ky. With this arrangement, emptying a full barrel is a safe one-man job without back strain.

From ground level the barrels of concentrated liquid must be raised about 30 in. to the top of the platform covering the mixing tank. The power drive of the mixer appears at the left in the illustration. This barrel hoist consists of a ramp, a section of track hinged at the top of the ramp, a hinged yoke at the bottom of the track, and a small hand-power rope winch mounted on one post of a gallows frame.



Rope hooked to yoke to illustrate method when lifting a barrel.

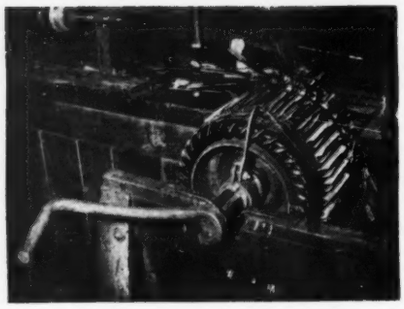
To use the device the rope is unhooked from the hinged yoke, the full barrel rolled over the yoke onto the track, the rope attached to the yoke and the winch cranked a few turns. When the end of the track has been hoisted the barrel then rolls to the platform.

•

Special Clamps and Cranks Facilitate Banding

From the standpoint of workmanship the sheave and weight method of banding has not been improved upon. It does not require a lathe or banding machine but does call for a few special tools which can be made at small expense in the mine shop. Photographs reproduced herewith show the array of special tools, consisting of cranks and wire anchoring clamps, used in the Wayland (Ky.) shop of the Elk Horn Coal Corp.

Although the wire anchoring clamps are not absolutely necessary, they save time and prevent slippage as compared to anchoring by such methods as soldering temporarily to the commutator or bringing the wire down over pads at the ends of the coils and tying to the shaft. The armature shown is from a Type MH88 motor for a Jeffrey 6-ton locomotive. Its winding had not been completed but for



Crank and clamp on an unfinished MH88 armature, showing how one end of the wire will be anchored for sheave and weight banding.

Banding tools required for the armatures commonly repaired in the Wayland shop.

illustrative purposes the special crank was put on, the pinion-end clamp attached and a banding wire anchored to it.

Cranks and clamps have been made for all of the armatures commonly wound in the shop. The following list refers to the chalked numbers in the illustration: (1) wire anchoring clamp for the slip-ring end of a 200-kw. General Electric converter; (2) commutator end of same converter; (3) pinion end of the Jeffrey MH88; (4) commutator end of 10-hp. Westinghouse SK; (5) commutator end of MH88 (also fits commutator end of an MH801 armature for a G.E. locomotive); (6) pinion end of above MH88 (fits into groove of the coil support bell); (7) commutator end of Westinghouse 3-hp. Type SK; (8) commutator end of 10-hp. G.E. Type RC10; (9) crank for Goodman 35- and 50-hp., Types 12A and 12AA shortwall cutters; (10) CY21-B2 G.E. cable reel; (11) Jeffrey MH88; (12) G.E. MH801, low-type locomotive; (13) Westinghouse 3-hp. SK; (14) G.E. Types 34 and 35 flat-top locomotives.

The sheave and weight method of applying coil holding bands to armatures has the advantage that the coils are more likely to be brought down gently but firmly and that the bands will be of uniform tension. Breaking a wire during the banding operation is hardly a possibility.

In this method enough wire is first applied loosely in approximate band positions to form all of the finished bands. Then, before the second anchorage is made, the wire is looped down and around a weighted sheave hung thereon. Next the armature is turned by the handcrank one direction and then another to wind and rewind the bands at the tension governed by the weight applied to the sheave. Thus, when the last turns of an early stage band succeed in seating the coils farther down, which action loosens the first part of the band, it is rectified when the band is rewound the next time across. Power required to turn the armature is only that necessary to overcome friction of the shaft in the stand notches or bearings and in the sheave.

•

Trip Lamp and Alarm Combined To Make One Unit in Use

"After experimenting with numerous types of trip lights and alarms," writes Ellsworth Rosser, safety engineer, Packer No. 5 colliery, East Bear Ridge Colliery Co., Girardville, Pa., "we finally worked one out to suit our needs and believe it might prove useful to others.

"The illustration shows the device in use on the front of a trip. It is made up in two parts. The light is a standard M-S-A trip lamp with bracket. On the front of the case a small clip was welded with an opening large enough to take a piece of ¼-in. flat iron 1 in. wide. This iron was made into a right-angle bracket, 6 in. on one leg, 3 in. on the short leg, with a small hole drilled near the end of the 3-in. leg to which a light spring about 5 in. long was bolted. On the

The spring-hung bell sounds an alarm to supplement the red light.

lower end of the spring we fastened a light bell.

"The 6-in. leg is slipped into the clip on the trip lamp and the device is complete. The conductor receives his lamp at the lamphouse every morning and returns it at night. The bell, being removable, stays with the haulage motor. This device has proved very successful. It is light and easily handled. It shows an excellent light and gives an excellent warning sound. It stands up well under hard usage and is very cheap. It also fulfills the law for a red light and alarm."

Cut Down Delays

When coal starts from the face to the tipple, delays must be cut to the minimum. Interruptions, by accidents or otherwise, must be expected in the normal course of events, however, and then the problem of geting the equipment back into service as quickly as possible comes up. Then is when the money- and time-saving idea comes into its own. *Coal Age* attempts to present the latest of these ideas, and welcomes suitable material for publication in these columns. Send in your idea. A sketch or photograph may make it easier to understand. Acceptable ideas are paid for at the rate of $5 or more each on publication.

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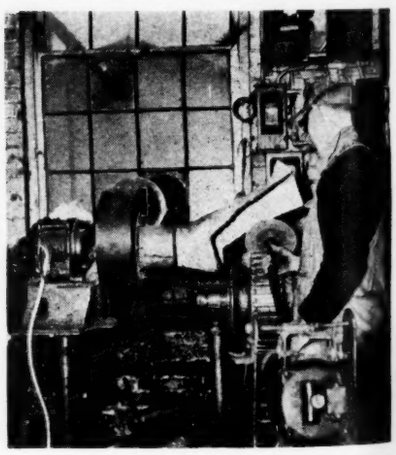
Blower in Corner of Shop Catches Lamination Dust

No longer does the dust from the cleaning of slots of armature laminations get into the atmosphere in the electrical repair shop of the Consolidation Coal Co., Jenkins, Ky. The illustration shows a hood and blower arrangement which is sucking the dust from around the grinding disk and blowing this dust out of the window.

A booster fan discarded from mine service was utilized for the job. It and the 2-hp. driving motor are permanently mounted on a pedestal about 2 ft. from the wall. To eliminate vibration difficulties, fabric is used for the tube connecting the blower discharge with the hole in the steel plate installed in place of a window pane.



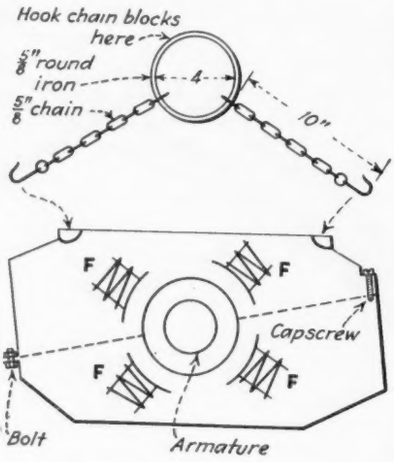
Grinding dust is whisked out of the shop.

By plan the equipment was arranged so that direction of rotation of the grinding disk naturally tends to throw the particles into the hood. This grinder is of flexible shaft type, its motor appearing in the foreground of the illustration.

•

Lifting Top Half of Motor Case Eased by Chain Sling

Terming it a handy article, E. C. Hitchcock, Summerlee, W. Va., offers the chain sling and ring shown in the accompanying illustration for lifting off the top halves of motor cases on Westinghouse or General Electric locomotives.



Sling design and method of use.

By hooking the chain block in the ring and the sling hooks into the tops of the case sections, they can be handled with safety and a saving in the time required to run a chain or rope through the rings, Mr. Hitchcock states.

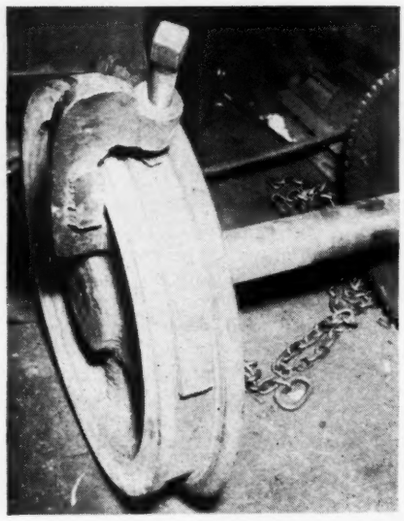
•

Haulage Scrap Makes Soles For Gathering Motors

A step beyond the ordinary in conservation of materials marks present tire banding and filling practice at the Pocahontas (Va.) shop of the Pocahontas Fuel Co. The accompanying illustration shows a half-circumference band section clamped into the groove of a gathering-locomotive tire which has been prepared for a build-up job by arc-welding.

The bands are forged at the mine shop from tires of main haulage locomotives which have been replaced by new tires. This puts the worn-out tire material back into coal production without the two-way transportation and the steel-mill work involved in making new tires. Moreover, it imparts to the repaired tire a surface having the same wearing and coefficient of friction qualities as a new tire.

In this case the band is ½x2 in. and the groove of the worn tire has been turned in a lathe to a flat bottom of width sufficient to leave welding spaces of ¼ in. or more on each side. The welding is done manually with bare electrodes starting at the heavy C clamp and working both ways. As the welding progresses and the band gets hot it is hammered to bring about a close seating.



Home-forged band of tire-quality steel in place ready for welding.

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New Mounting for Test Bug Used Available Parts

To save time and provide a more flexible arrangement in the use of floor space, the armature testing growler, or bug, in the Jenkins (Ky.) shop of the Consolidation Coal Co. was changed from a hanging position on a well-mounted jib crane, where it had been used for years, to a truck mounting. This portability means that no longer does the armature work have to be crowded into the floor space under the swinging boom or the armatures and their stands have to be moved to that position for testing.

A standard warehouse truck was utilized for the job and an adjustable screw mounting was fashioned from a worn brake screw and wheel of a mine locomotive. Balance was imparted to the truck by adding a pair of small wheels at the back, toward the handles. The growler is a standard unit consisting of a curved-face laminated horseshoe core with a coil of wire at the center. When the pole faces are placed against an armature and alternating current is put through the coil, any shorted coil or turn in the armature has a high current induced in it. This current, indicating the fault, is detected by additional load taken by the growler, by a magnetic strip, by heat or by an electrical instrument.

Mounted on a warehouse truck with a locomotive brake screw and handwheel.

•

Makings for Babbitt Packing Usually Are on Hand

Experienced maintenance men know the dangers and difficulties of attempting to use damp or wet clay for packing around a babbitting job. Dry sand sometimes is used, but on most jobs it is a rather poor practice. That it is not always necessary, however, to keep on hand a commercially prepared compound is indicated by a practice noted recently in the Seco (Ky.) mine shop of the South-East Coal Co. Here a babbitting compound is made as needed by mixing "powdered" or loose asbestos with a thick cup grease.

This mixture is free of moisture and, as indicated in the illustration, can be rolled up into long strings. It is best to use as little grease as will make the fibers stick together. Usually there is a tendency to use too much grease, in which case the compound gets better with use. Quoting a mechanic at the mine, "the older and dirtier it gets, the better." That indicates that it might be best if, at the beginning, some very fine and dry powdered clay or other pigment were added, as probably is done in commercial manufacture.

Fashioning a babbitting stringer from shop mixed compound.

The AMERICAN Way to Recover Valuable Fine Coal

WASHERIES produce fines. And usually these fines have a high combustion value. They're worth recovering directly.

But how?

By filtering on the American Continuous Disc Type Vacuum Filter, such as illustrated above! It is standard practice in several washeries because the American Filter economically reduces the moisture content of the fines to where it is practical to dry the filter cake or add it to larger sizes for coking purposes.

Today, when every ton of coal counts, investigate the use of the American Continuous Filter for the economical dewatering of coal fines in your plant. In helping you with this, we would bring to your problems, thirty-six years of broad filtration experience in every process industry with considerable work done in the coal industry.

A phone call or letter to our nearest office will bring a trained engineer.

• • •

Among the coal companies using Oliver United Filters for dewatering fines are: Weirton Steel Co., Woodward Coal and Iron Co., Crucible Steel Co., Republic Steel Corp., Jones & Laughlin Steel Corp. Buckeye Coal Co., Pittsburgh Coal Co., and Hanna Coal Company. More than 5,000 tons of coal fines are dewatered daily on Oliver United Filters.

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COAL AGE NEWS ROUND-UP

Protection of Fuel Consumers the Goal In 1943 Coal-Stocking Campaign

MAINTENANCE of an adequate supply of coal by ordering early and carrying adequate stocks is the goal in the 1943 stocking campaign, now under way with the Office of Solid Fuels Coordinator for War as the program coordinator. Sponsors include various government agencies concerned with fuel supply and transportation; national and local associations of operators, wholesalers and retailers; the United Mine Workers of America; National Association of Purchasing Agents; the U. S. Chamber of Commerce and various local chambers of commerce and trade and industrial groups; and journals dealing with coal production, wholesale and retail distribution, and utilization.

"This program," points out H. A. Gray, Deputy Solid Fuels Coordinator, "is designed to make possible the production and transportation of an adequate supply of bituminous and anthracite coals in 1943. It is to be executed by the President's direction under the following responsibilities given Solid Fuels Coordinator for War Harold L. Ickes in his letter of Nov. 5, 1941:

"'In cooperation with the solid fuels and related industries and in coordination with the Office of Production Management, carry on such programs as will promote economy and efficiency in the development, production, utilization, transportation and handling of solid fuels, and as will facilitate the operation of the solid fuels industries so as to meet the requirements of the national defense programs.'

"This is a campaign born of war-time necessity. Although it promotes the sale of a product of private industry, that product—coal—is vital to winning the war.

"A somewhat similar campaign in 1942, under which bituminous coal in storage was increased to more than 90,000,000 tons—the greatest storage in history—clearly demonstrates its value as a war-time fuel security measure.

"The numerous branches of the coal industries, mine-employee representatives, transporters of coal, State and local governments, organizations whose members use coal and all other groups interested in the nation's fuel security are urgently requested to help in any appropriate way they can in informing the coal-using public of the objectives of this program and in enlisting public cooperation in attaining them."

The objectives, designed to permit mining and distribution to be carried on at a maximum rate throughout the year, are to show coal users that they should take voluntary action as follows:

Industrial Users

1. Contract for, or order, coal as soon as possible.
2. Allow suppliers the fullest possible latitude as to size and kind of coal, shipping or delivery schedules and type of transportation equipment used.
3. Seize every opportunity to build up stockpiles as follows: (a) essential war industries, 90 to 120 days' supply; (b) other industrial users, 60 to 90 days' supply.
4. Keep stockpiles, when built to adequate size, at that level as long as coal is available—the best insurance against an emergency.

Users Purchasing Through Retailers

1. Order coal immediately and store as much this summer as local conditions will allow.
2. Cooperate with dealers and allow them the fullest possible latitude as to size and kind of coal and delivery arrangements.

The campaign will be carried on both nationally and locally. The government, in cooperation with the other sponsors, will carry on a coordinated general campaign on a national basis. The plan, in cooperation with the Office of War Information, is based on operation through the newspapers, the radio, trade journals and other appropriate media of a campaign designed to promote a general understanding of war-time heating problems among consumers and other interested parties, including producers. Regional and local organizations participating are urged to organize and conduct campaigns suited to conditions in their particular localities and fields of operation, using whatever means are available for disseminating information.

The National Coal Association will specialize in phases of the campaign dealing with bituminous coal. Anthracite Industries, Inc., will take care of anthracite participation, with the American Mining Congress assisting in both fields and in other respects. The American Coal Sales Association will deal with both fuels, as will the Solid Fuels office, OWI, and the Bituminous Coal Consumers' Counsel. Timing in respect to stocking operations will be emphasized, in addition to other factors.

The outline of the bituminous program was issued early in April. A meeting of representatives of the various branches of the anthracite industry with the Solid Fuels Office was held in Washington April 19 to determine the final form of the anthracite program. Differences over how the anthracite campaign was to be conducted were reported to have been behind the earlier resignation of Gen. Brice P. Disque, as assistant solid fuels coordinator.

•

30-Day Coal-Act Extension Voted by Congress

Extension of the Bituminous Coal Act of 1937 for a period of 30 days from April 26 was voted by Congress April 22 just before the House adjourned for the Easter holidays. Originally set for 120 days, the extension period was pared down in the Senate, with the House concurring.

With time forbidding the holding of hearings and consideration of measures already introduced for extension and amendment of the act, the move for a temporary extension, stated to have Administration backing, was made by the House Ways and Means Committee, which previously had assented to formation of a sub-committee to expedite action on the proposed revisions and extension. Extension for a period of 120 days from April 26 was proposed in a joint resolution (H. J. Res. 113) offered in the House April 10 by Representative Doughton, chairman of the Ways and Means Committee, to which the resolution was referred. Reporting of the resolution to the House was unanimously voted by the committee April 14.

After the Rules Committee had reversed itself and given the resolution a rule, which was voted on favorably by the House, the resolution was brought out and passed April 21 by a vote of 99 to 6. On a point of order, however, the House struck out a $970,000 appropriation for operation of the act for the 120-day period. The objection was that the Ways and Means Committee was without authority to ask the appropriation. It was understood that funds would be provided through a deficiency appropriation cleared through the Appropriations Committee.

Senate action on the resolution took place on April 22, the Interstate Commerce Committee having first decided to cut the period to 30 days. This was

voted by the Senate and accepted by the House the same day. One view was that the reduction to 30 days would give John L. Lewis, who asked that he be given a chance to be heard before the committee in the near future, a club over operators in his attempt to get administration of the act back into the hands of a commission. Another explanation was that the shorter term was adopted to head off amendments which might have held up extension.

•

Freight-Rate Rise Cancelled

Acting upon a petition by the OPA, joined in by the Secretary of Agriculture and others in Ex Parte 148, the Interstate Commerce Commission, in a 6 to 5 decision handed down April 12, cancelled the general freight-rate increases which went into effect March 18, 1942. The cancellation, however, is temporary, being effective from May 15, 1943, to Jan. 1, 1944, during which time the record already established will be held open for further consideration in the light of developments during the interim. To break a tie, ODT Director Eastman voted for the cancellation. Passenger increases, however, were left undisturbed. The Commission also left undisturbed a few special war-time rates.

The increases on coal authorized in Ex Parte 148 were 3c. per net ton where the rates were $1 or less and 5c. per net ton on rates over $1.

•

St. Lawrence in Again

Despite previous failures to get approval in treaty and by legislation in Congress, the old St. Lawrence seaway and power project again popped up in April in the House of Representatives. It is the subject of H.R. 2278, 2280 and 2284, identical bills introduced, respectively, by Congressmen Culkin, New York; Pittenger, Minnesota; and Wasielewski, Wisconsin. All were referred to the Committee on Rivers and Harbors.

•

Scrap Still Needed

Copper, brass and bronze have been added to the list of scrap materials urgently needed to support the war effort. In addition to iron and steel and other scrap material, the War Production Board now asks a 62½-percent increase in the flow of copper, brass and bronze scrap in 1943. The need is for a total of 1,625,000 lb., which will produce approximately 1,000,000 lb. of copper for the war effort.

WPB again urges all mines and manufacturing plants to check on possible "dormant scrap" supplies in the form of unused machinery, equipment, tools, dies, fixtures, etc., which are incapable of current or immediate future use in the war effort because they are broken, worn out, cannot be repaired, etc. "If it hasn't been used in three months and someone can't prove that it's going to be in the next three, sell it or scrap it," says WPB.

May 1 Ushers in Coal-Mining Stoppage: Army Seizures Reported in Prospect

AMID REPORTS that the government would move to seize the properties, May 1 brought with it a stoppage in coal mining after President Roosevelt had unsuccessfully ordered bituminous members of the United Mine Workers to continue work. The only exceptions were reported to be in Illinois, where the Progressive Miners of America voted to stay on the job, and a few outlying U. M. W. fields. Anthracite also stopped work May 1 following failure to arrive at an agreement, although the dispute was certified to the War Labor Board April 30 by Secretary of Labor Perkins.

President Roosevelt received the Appalachian wage dispute from WLB April 28, and on April 29, in a strongly worded telegram to John L. Lewis directed the miners to continue coal production and end the disputes already in progress. The outbreak of a wave of wildcat strikes, unopposed by union officials, which by April 30 had involved over 100,000 men in Ohio, Pennsylvania, West Virginia, Kentucky, Alabama and elsewhere, prompted WLB to refer the controversy to the President. WLB had taken jurisdiction in the case April 22 after Secretary Perkins and Dr. John R. Steelman, director, U. S. Conciliation Service, had been unsuccessful in attempts to secure agreements based on increasing the miners' earnings with no change in present rates.

Following certification to WLB, Lewis ignored both a call to a meeting to discuss procedure and a request to submit nominees for the labor member of a three-man panel set up to hear the case. The union policy committee met in New York April 27, and after that meeting Lewis reiterated his earlier declaration that the miners "would not trespass" on the operators' properties in the absence of a contract. The committee, in a letter to Madam Perkins, stated that the miners were ready to accept guaranteed employment, declared that a hook-up between steel and coal interests and certain politicians was preventing an agreement, attacked WLB as "malignant" in its attitude toward the miners' union and wound up with the suggestion that "government authorities should direct the coal operators in Washington, who have abandoned this conference and dishonored their agreement, to return forthwith and work out an agreement through collective bargaining, without political implications."

Roosevelt Bans Stoppage

Taxing the union with ignoring WLB, President Roosevelt stated that he had instructed OPA to check price rises and prosecute any illegality, declared the strikes a violation of labor's "no-strike" pledge, termed them an interference with the prosecution of the war and a challenge to the power of government, stated that production must continue, and concluded as follows:

"The enemy will not wait while strikes and stoppages run their course. Therefore, if work at the mines is not resumed by 10 o'clock Saturday morning, I shall use all the power vested in me as President and commander-in-chief of the Army and Navy to protect the national interest and to prevent any further interference with the successful prosecution of the war."

Replying April 30, Lewis and other U. M. W. officials declared that "we want an agreement. We want to work," at the same time attacking WLB and stating that the operators had blocked agreement on a new contract.

With 30-day extensions signed, both the north and south resumed negotiations following March 31. Also in attendance was Dr. Steelman, who appeared on the scene March 29 to promote adoption of the southern extension. Following the examples of the northern and southern and other groups, all regions in the country adopted extension agreements, with the result that there were no interruptions in work, except for a few scattered mines.

April 4 brought with it information to the effect that WLB was considering dropping other matters and taking jurisdiction.

Certification of the dispute to WLB was asked of Dr. Steelman in a statement presented to him by Edward R. Burke, spokesman for the southern operators, April 6. Pointing out that "every other labor union that operates under the general law must ultimately submit its demands for an increase in basic wage rates to the War Labor Board for approval" and that "every employer is prohibited from paying such increases without the sanction of that board," the statement called attention to the miners' wage demands and their refusal to join in submission and then went on to say: "We now ask Dr. Steelman, government conciliator, to certify this case to the War Labor Board in the regular way as one in which it is clear that an agreement cannot be reached through the normal process of collective bargaining. We hope that such certification will be made, but unless we can have that assurance now the operators in the southern conference will themselves request that the War Labor Board take jurisdiction."

Receiving no answer from Steelman, the southern group wired WLB April 8 asking that it take jurisdiction. WLB, on April 9, referred the request to Madam Perkins.

Extension Rejected

The miners rejecting a resolution that the present agreement be extended for the duration of the war, the northern negotiating committee made public April 7 a report concluding as follows: "The operators' negotiating committee believes that further conferences for collective bargaining will not be able to consummate an agreement and believes that all parties at interest should be so notified." The resolution read:

"Whereas, the coal operators represented in the Appalachian Joint Conference have been in continuous session with the United Mine Workers of America since March 10; and

"Whereas, during that period of time consideration and discussion of the demands of the mine workers have occurred; and

"Whereas, the United Mine Workers of America have not substantiated by factual data or proper argument any justification for the extraordinary demands for wage increases and other concessions made to the conference;

"Therefore be it resolved, that the existing wage agreement should be continued for the duration of the war, subject to such changes as may be required by governmental policy or by standards fixed by the government for the economic stablization of the country."

Major points at issue at that time, according to the operators' committee, were: the demand for a wage increase of $2 a day and the demand for a portal-to-portal basis of payment. These and others, the committee held, would add greatly to production cost. At a press conference, it was announced that notification to parties of interest would include the various governmental agencies concerned. At this same press conference.

Keeping Step With Coal Demand

Bituminous Coal Stocks

Thousands

	Net Tons Mar. 1 1943	—P.C. Change— From Feb. 1 1943	From Mar. 1 1942
Electric power utilities	19,056	−1.1	+41.6
Byproduct coke ovens	9,782	−1.8	+24.0
Steel and rolling mills	1,069	−1.5	+ 7.4
Railroads (Class 1)	11,361	−1.8	+17.6
Other industrials*	28,099	−3.7	+50.8
Total	69,367	−2.4	+36.9

Bituminous Coal Consumption

Thousands

	Net Tons Feb. 1943	—P.C. Change— From Jan. 1943	From Feb. 1942
Electric power utilities	5,376	−10.1	+ 4.3
Byproduct coke ovens	6,967	−9.3	+ 4.2
Steel and rolling mills	1,021	−2.7	+ 8.9
Railroads (Class 1)	11,404	−0.3	+28.4
Other industrials*	14,279	−6.6	+ 5.5
Total	39,047	−2.4	+11.3

* Includes beehive ovens, coal-gas retorts and cement mills.

Coal Production

Bituminous

Month of March, 1943, net tons	56,450,000
P.c. change from March, 1942	+18.1
January–March, 1943, net tons	152,489,000
P.c. change from Jan.–March, 1942	+ 8.1

Anthracite

Month of March, 1943, net tons	5,822,000
P.c. change from March, 1942	+14.5
January–March, 1943, net tons	15,228,000
P.c. change from Jan.–March, 1942	+ 5.8

Sales of Domestic Stokers Vs. Oil Burners

	Coal Stokers	Oil Burners
February, 1943	2,130	1,570
P.c. change from Feb., 1942	−72.7	−85.9
January–February, 1943	3,894	3,640
P.c. change from Jan.–Feb., 1942	−72.2	−84.8

Index of Business Activity*

Week of April 17	204.1
P.c. change from month earlier	+1.5
P.c. change from year earlier	+14.7

* *Business Week*, April 24.

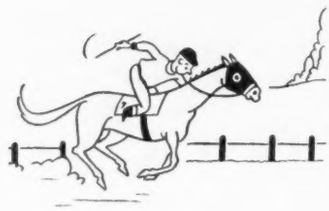
Electric Power Output†

Week ended April 17, kw.-hr.	3,916,794,000
P.c. change from month earlier	−0.7
P.c. change from year earlier	+18.4

† Edison Electric Institute.

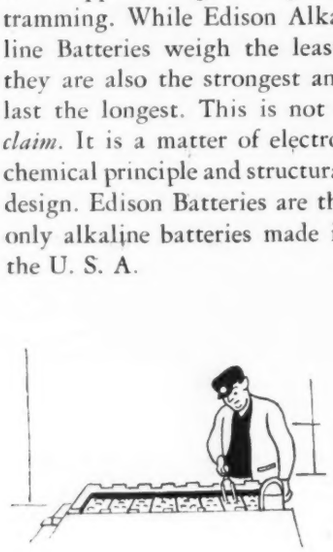
Keeping Peaks Down.

When haulage units are powered by alkaline batteries it isn't necessary to add the haulage load to the hoisting load—the battery charging can be done at off-peak hours. This means a lower maximum demand and a higher utilization of existing distribution lines.



Lean Horses are Popular.

"Give me a lean horse for a long race," was never truer than when applied to gathering and tramming. While Edison Alkaline Batteries weigh the least, they are also the strongest and last the longest. This is not a *claim*. It is a matter of electrochemical principle and structural design. Edison Batteries are the only alkaline batteries made in the U. S. A.



Maintenance Simplified.

Untrained men can do a lot of damage just "learning how." With alkaline batteries, maintenance runs the least risk—they have even been charged in reverse. And, they are as rugged physically as they are electrically—because they are built of steel. In few services do batteries take as much punishment as in mines—reason in itself for preferring steel construction.

Edison Storage Battery Division
Thomas A. Edison, Inc.
WEST ORANGE, N. J.

THIS POWER must not fail

The man in the factory is at the mercy of the man in the mine. If the critical materials don't come through—neither do the tanks and guns. But the industries and mines have an ally in common. The vital material-handling systems of industry are the battery industrial trucks; more than 50% are powered by Edison Alkaline Batteries.

Vital to transportation in mines are the locomotives and shuttle cars—where again the alkaline battery is proving its worth in getting the war production through. Thomas A. Edison, when he invented the alkaline storage battery, contributed more to winning World War II than even he could have guessed.

Yes, alkaline batteries are the most dependable portable power the world has ever known. Electrically, chemically, structurally, they are made to order for today's stringent demands. Dependability is the reason for their success in mines, on railroads, throughout industry and aboard ship.

MINING NEEDS THE DEPENDABILITY OF

Edison Alkaline BATTERIES

COMING MEETINGS

- American Mining Congress: May 17 and 18, Cincinnati, Ohio.
- Mine Inspectors' Institute of America: annual convention, May 24 and 25, Deshler-Wallick Hotel, Columbus, Ohio.
- Illinois Mining Institute: 25th annual boat trip and summer meeting, June 4-6, from St. Louis, Mo.
- Smoke Prevention Association of America, Inc.: annual meeting, June 8-11, William Penn Hotel, Pittsburgh, Pa.
- Rocky Mountain Coal Mining Institute: annual meeting, Cosmopolitan Hotel, Denver, Colo., June 24-26. Postponed April 26.

April 8 was marked by a joint conference of the northern and southern groups with the miners at the behest of Steelman, who stated that negotiating procedure was debated, along with points that might be discussed aside from direct wage demands.

Issuance of a new wage-price stabilization order by President Roosevelt also took place on April 8. In addition to placing ceilings on farm prices and transportation rates and curbs of job changing, the order included the following provisions relating to wages:

"The National War Labor Board, the Commissioner of Internal Revenue and other agencies exercising authority conferred by Executive Order 9250 or Executive Order 9299 and regulations issued pursuant thereto over wage or salary increases are directed to authorize no further increases in wages or salaries except such as are clearly necessary to correct substandards of living, provided that nothing herein shall be construed to prevent such agencies from making such wage or salary readjustments as may be deemed appropriate and may not have heretofore been made to compensate, in accordance with the Little Steel formula as heretofore defined by the National War Labor Board, for the rise in the cost of living between Jan. 1, 1941, and May 1, 1942.

"Nor shall anything herein be construed to prevent such agencies, subject to the general policies and directives of the Economic Stabilization Director, from authorizing reasonable adjustments of wages and salaries in case of promotions, reclassifications, merit increases, incentive wages or the like, provided that such adjustments do not increase the level of production costs appreciably or furnish the basis either to increase prices or to resist otherwise justifiable reductions in prices."

The order was greeted by Lewis April 9 with a statement that it "leaves the mine workers still hungry and resentful of having their demands for bread made a political pawn. . . . The mine workers have been holding ever since they have been here that the wage structure in the coal industry is substandard compared with any basic or essential industry." Fur-

thermore, said Lewis, the portal-to-portal decision by the 5th Circuit Appeals Court "remains unchanged by the President's executive order and constitutes a legal estoppel against the mine workers executing an agreement that does not conform to the federal statute and the court's decree."

Later press conference discussion of the portal-to-portal question brought out the fact that the miners did not consider themselves bound by a joint letter signed by the Appalachian Joint Conference Negotiating Committee and Earl E. Houck, director of the legal department, United Mine Workers, July 9, 1940, to Col. William E. Fleming, administrator, wage and hour division, Department of Labor, asking that the division approve the principle of payment for time worked at the face, and stating that "the uniform high rates of pay that have always been included in the wage agreement of the mining industry contemplate the employee's working day beginning when he arrives at his usual working place." This principle was accepted by Col. Fleming in a letter to Mr. Houck dated July 18, and on July 25, 1940, the division issued a press release announcing that it considered the face-to-face method of computing working time as not unreasonable.

President's Order Approved

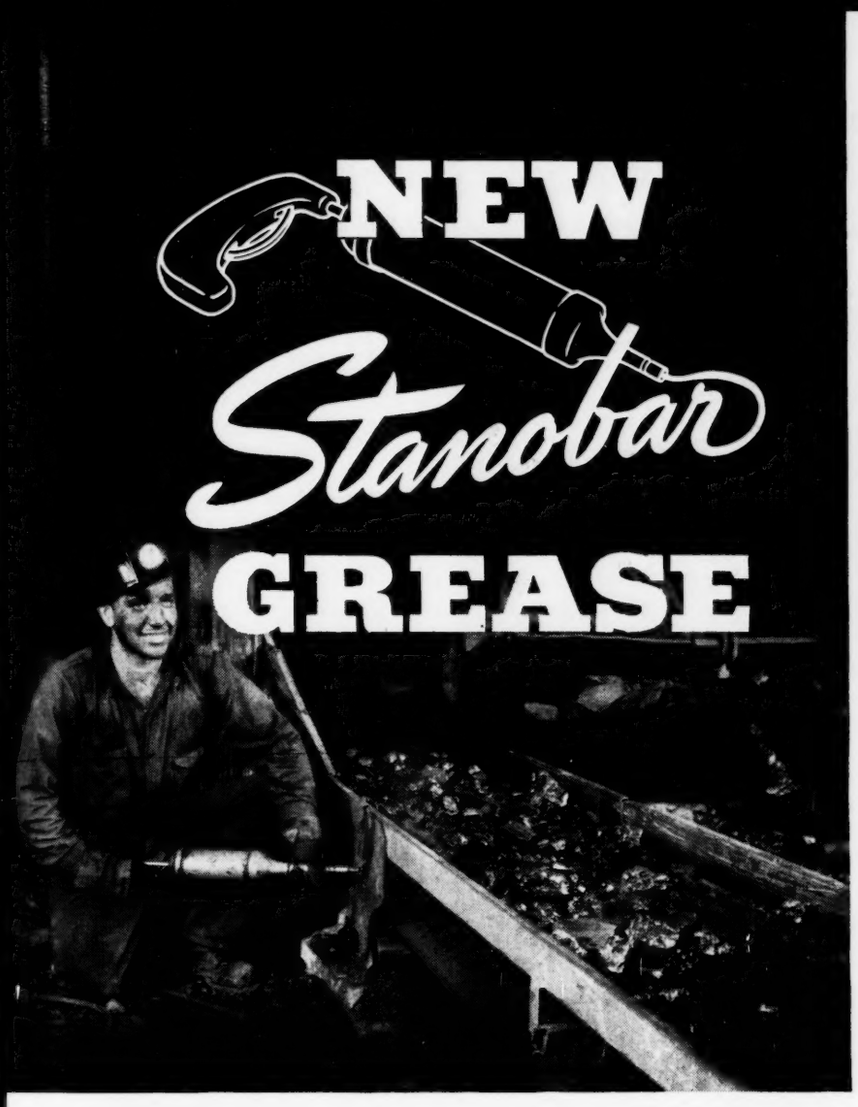
The President's order, stated Charles O'Neill, spokesman for the northern group, on April 9, "confirms the position we have taken throughout the conference." Declaring further that the facts provided for the conference prove that wages "are not on a substandard level," Mr. O'Neill stated that "as we understand the order, this conference should accept the operators' proposal for the extension of the present agreement."

Also voicing approval of the President's order, Senator Burke, southern spokesman, announced the preparation of the following resolution for submission to the southern conference:

"Resolved, that all basic and district wage agreements in the areas governed by this conference be extended to April 1, 1944, or to a day 30 days after the President of the United States shall declare a cessation of hostilities, whichever of these contingencies first occurs. The parties hereto agree to meet at a time and place to be mutually agreed upon 20 days prior to the expiration date of this agreement to consider what revisions, if any, shall be made in this agreement as to hours, wages and conditions of employment."

A guaranteed work year was proposed to the northern group by Mr. Lewis on April 9. Although rejected by the operators as impracticable, this proposal was seized upon by Dr. Steelman and Madam Perkins for later submission to both the northern and southern groups. Meantime, however, Senator Burke, on April 12, wired the President as follows:

"We beg to assure you that to the full extent of our ability we will hold our part of the line as directed by you against any break-through by the forces of inflation. We know that the 165,000 miners employed by us have received wage increases far in excess of the Little Steel



It's easier to handle in grease guns

• EVERY FEATURE in new Stanobar Grease No. 2 fits it for the new problems in lubricating ball and roller bearings in war-pressed equipment. It's a smooth-type (not fibrous) grease that is easily handled in grease guns and lubricating equipment. It contains inhibitors which reduce oxidation of the soaps and oil in Stanobar. Therefore, it does not cake or harden in bearings, and less grease and less labor are needed to flush out old grease from sealed bearings.

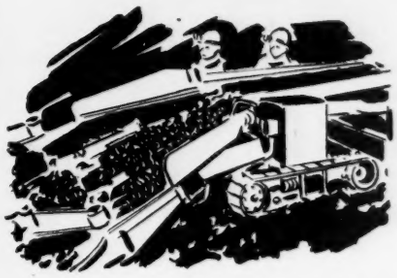
Stanobar also resists thinning out when worked, which reduces leakage. Stanobar is made in one grade, a No. 2 consistency which may enable you to use Stanobar in place of two or three grades of grease you are now using.

Let a Standard Lubrication Engineer explain other advantages of Stanobar Grease—and help you make a test.

CHECK THESE ADVANTAGES OF NEW STANOBAR GREASE

. . . Easily handled in grease gun.
. . . Resists thinning-out when worked.
. . . Does not oxidize and form deposits.

★ Take a LOAD off your loaders ★



Probably no other equipment is getting the punishment that your loaders must take to keep coal flowing out. Make them the first on the list for a lubricating checkup. Standard's line of new Superla Mine Loader Lubricants—four grades of thickened oils—covers practically all requirements for lubricating loader transmissions and gear cases, including older equipment which may require a heavy type lubricant.

New Superla Mine Loader Lubricants include:

No. 3—A dripless oil for fairly tight gear cases.

No. 5—A fibrous structure thickened oil for gears and transmissions. Particularly useful in reducing consumption.

No. 6—A smooth type thickened oil for gear cases and gathering head pots. Can be applied with pressure gun for bearings.

No. 8—A heavy thickened oil for armature bearings and make-up in cases requiring a leak-proof lubricant.

Indoils . . . Three grades of straight mineral oils for hydraulic systems.

No. 95, **No. 75**, **No. 41** } Provide a range of viscosities to meet all loader hydraulic system requirements.

Let a Standard Lubrication Engineer help you select—and test—the lubricants you need. Call any Standard Oil Company (Indiana) office, or write 910 South Michigan Avenue, Chicago, Ill., for the Engineer nearest you.

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formula and that no showing can be made that increases are necessary to correct substandards of living. Therefore, without violating your executive order, no agreement can be made that would grant a single one of their demanded wage increases. Under these circumstances, we are at a loss to understand why the director of the conciliation service persists in his effort to secure an agreement granting increases which you have expressly prohibited. Surely he does not expect that anyone with intelligence will be misled into believing that a wage increase will be any less an increase if made in the form of relieving employees from payment of proper charges or by calling it a payment for non-productive time consumed by the miners in getting to their places of work. . . .

"We recognize that the National War Labor Board and the Stabilization Director have the final responsibility in determining what constitutes a wage increase and whether such demands should be approved or denied. We request a speedy and just determination of these issues. . . . The contract has but a short period to run. There is still time enough if the Secretary of Labor will certify the dispute at once to the War Labor Board or, failing in that, if the board will now take jurisdiction on its own motion. There should be no request or demand by anyone for a further extension subject to retroactive liability. We therefore respectfully ask that you take whatever action you may consider appropriate and necessary to cause this dispute to be heard on its merits without delay by the National War Labor Board."

OPA Will Adjust Prices

On the subject of retroactive liability, J. D. Battle, executive secretary, National Coal Association, reported receipt of a letter dated April 9 from J. K. Galbraith, deputy administrator, OPA, stating in part that "it is the intention of the OPA that maximum prices for bituminous coal will remain unchanged for the period of wage negotiations. . . . Furthermore, if a retroactive wage increase should result from the negotiations, and even if such increase should be approved by the responsible government agency in charge, no retroactive price increase will be authorized. The OPA will, however, adjust maximum prices to take into account any retroactive wage increase resulting from any wage agreement which may be made in accordance with the Price Control Act and the President's order creating the Office of Economic Stabilization. Adjustments for such retroactive wage increase will take the form of an increase in maximum prices which will spread the compensation for the retroactive labor cost over the remainder of the coal year to April 1, 1944. These adjustments, if required, will be made subsequent to the conclusion of the new wage agreement."

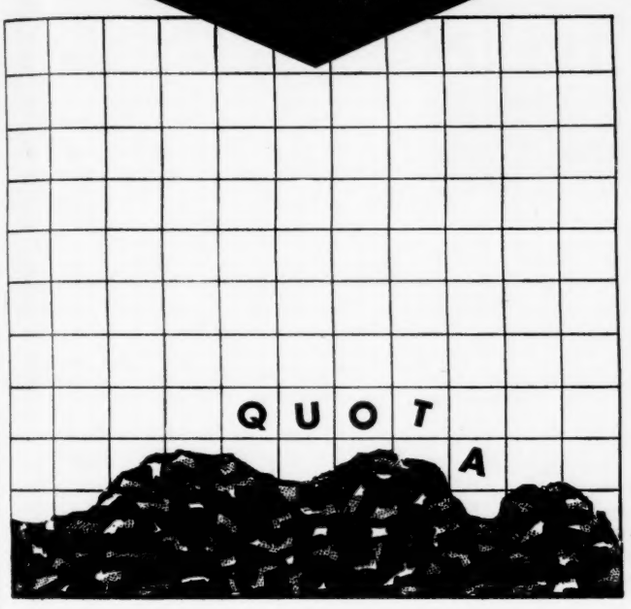
The northern operators, on April 13, also made a further request for assumption of jurisdiction by WLB in the following telegram to Madam Perkins:

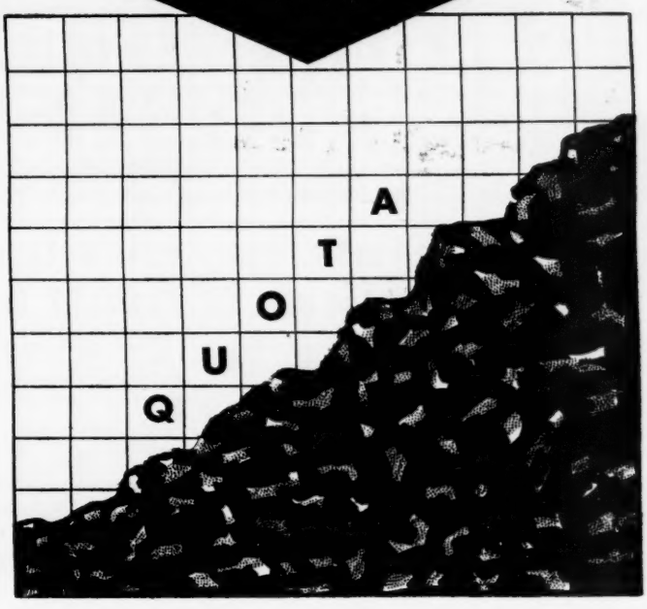
"Please refer to our telegram to the President March 19, 1943, advising that the time then remaining before termina-

PRECISION-PERFECT LUBRICANTS

may mean the difference between

THIS and THIS





Every coal mine operator knows that a lagging machine can easily bottleneck the whole production system.

It is well worth remembering, however, that *adequate* lubrication of that machine may eliminate the bottleneck!

To protect overworked machinery, and to insure smooth, steady performance—change over *now* to *Precision-Perfect* lubricants—Cities Service lubricants—designed especially for your particular mining job. They have been developed to give maximum service and protection for specific mining operations.

Whether your lubrication requirements are simple or complex—Cities Service is ready to serve you with precise, top-quality products and expert engineering counsel.

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Loader Greases	Cable Compounds
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tion of the wage agreement in effect at the Appalachian coal mines was too short to permit of completion of an agreement during the remaining days to April 1, 1943, and also his reply to us dated March 22, advising that the dispute between the operators and the United Mine Workers must be settled like any other dispute under the national no-strike agreement by the peaceful means set forth in Executive Order No. 9017 and also under Executive Order No. 9250 providing for a final determination if necessary by the National War Labor Board.

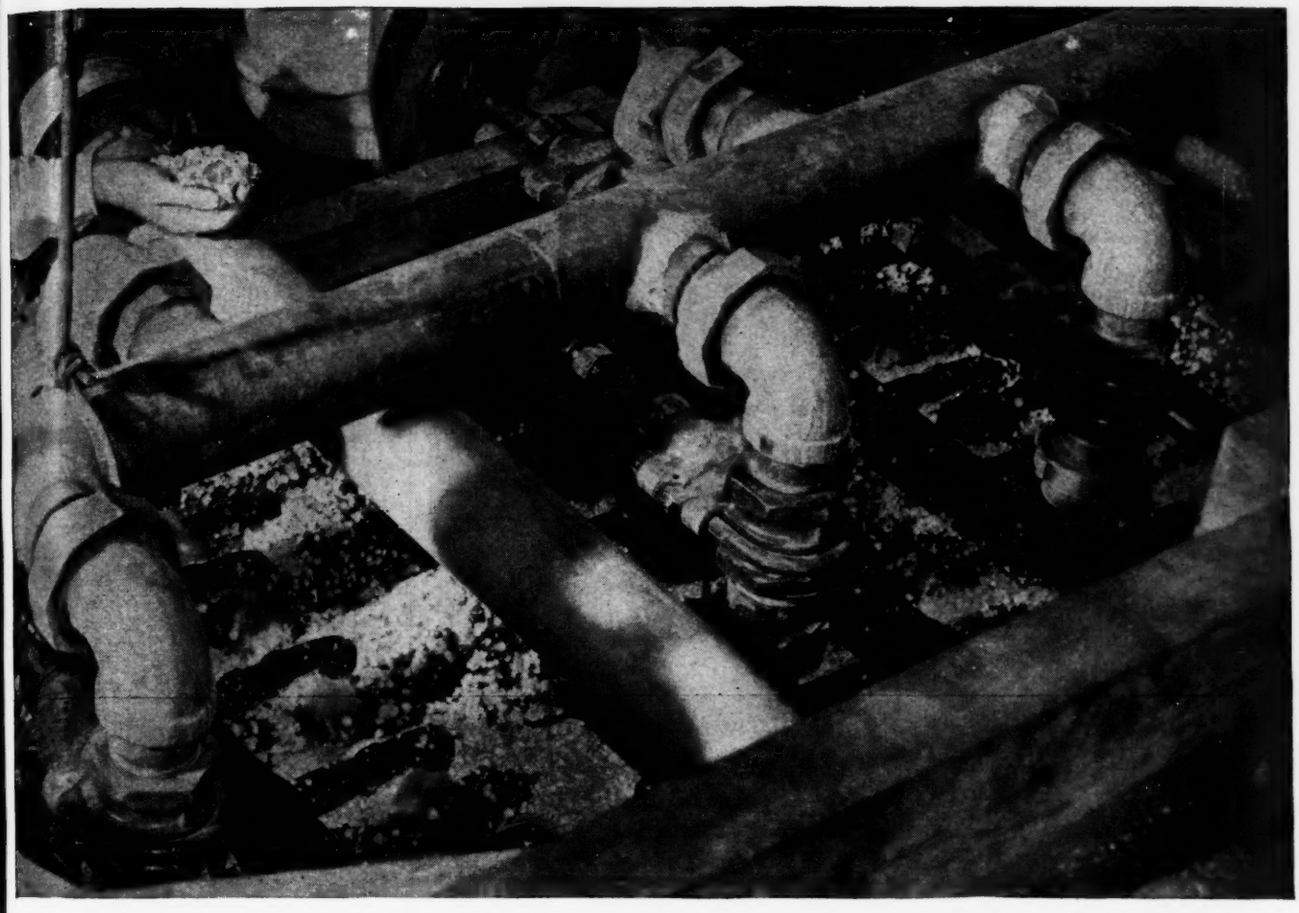
"Pursuant to instructions the operators have endeavored to make a fair settlement of the dispute with all speed consistent with a complete examination of the issues. We regret to advise that no progress was made by collective bargaining. We also advise that conciliation which has been in progress since April 1 has likewise failed to produce an agreement.

"The issues are fundamental to the economy of the nation. These issues must be finally determined between now and May 1, 1943. We urge that this dispute now be certified to the War Labor Board so that it may take such action as it deems advisable and in accordance with the above-named executive orders and the wage-price order of April 8. Copies of this telegram are being forwarded to the National War Labor Board, the Office of Economic Stabilization and the Coordinator of Solid Fuels for War."

Guaranteed Work Proposed

The campaign by Madam Perkins and Dr. Steelman to get the miners an increase in pay without changing present rates culminated in an official proposal by Steelman to the northern group April 13 that the six-day work-week basis be adopted as a part of the new contract. Previously, it was reported, government representatives also had had under consideration proposals for concessions for portal-to-portal pay and elimination of all charges for materials, equipment and services, such as lamps, tools, safety shoes, hats and other equipment, blacksmithing, etc.

The Steelman proposal was accepted by the miners on the understanding that the operators would guarantee that employment would be open six days a week 52 weeks a year. The operators rejected it on the grounds that it did not outline what they eventually might be stuck for even though the present increase in cost appeared to be $300,000,000 annually, represented a radical departure from past practice not only in coal but in other industries and was impossible because the industry could not guarantee maintenance of demand and elimination of transportation shortages or possible accidents which would require mines to shut down for shorter or longer periods. Answering charges made by the union, Dr. Steelman and Madam Perkins that the operators were taking advantage of increased maximum prices and yet were working only five days or less a week, the operators' spokesman stated that work would continue on a six-day-week basis as far as possible in accordance with existing wage agreements.



OUT OF THESE FLOCS MAY COME THE FUTURE OF THE WORLD

These white crumbs or "flocs" look very unimportant in themselves . . . but on them may depend the future of the world. They are one of the first stages in the production of synthetic rubber, the most vital material being produced in America today.

Naturally, you are interested in synthetic rubber. But synthetic rubber is only incidental. What is really important is what happens to synthetic rubber after it is actually produced. It is chemistry that makes rubber fit to use, suits it to the task at hand.

United States Rubber Company is the largest manufacturer of rubber chemicals in the world. We have worked with rubber, improved it and broadened its uses for 100 years. Today, all this tremendous fund of knowledge of the chemistry of rubber is being drawn upon to improve synthetic rubber, perfect it for the jobs it must do for the Armed Forces and war industry.

The chemistry of rubber is what determines the final compounding and processing of the flocs of synthetic rubber you see here. They may eventually go into bullet-sealing hose, air ducts, or any one of a score of other parts used in the plane that will blast the last Nip carrier off the sea. They may be made into a tire that will rumble down bomb-battered Unter den Linden. They may go into some essential equipment like a conveyor belt that will keep America's war production line moving at top speed. They might very easily determine the entire course of the war, and thereby the future of the world.

Synthetic rubber, its production, compounding and application to war and industrial uses, is too big a story to present adequately here. There are five basic commercial types of synthetic rubber. Each of them has distinct properties and characteristics. Not a single one is ideal for all purposes.

Deciding which synthetic rubber to select and use for a particular task is an equally big story, a decision that requires expert knowledge and broad range experience.

We have told the story of the five basic commercial types of synthetic rubber, our more than twenty years of experience in working with them, and our twelve years of using synthetic rubber commercially in an interesting, informative booklet for business executives. Please ask for your copy on your regular business letterhead.

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In Canada: Dominion Rubber Co., Ltd.

Bureau of Mines Approvals

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in March, as follows:

Jeffrey Mfg. Co.—Type 61 power unit for conveyors; 20-hp. motor, 220 volts, a.c.; Approval 474; March 1.

Joy Mfg. Co.—Type 14BU-6PMF loading machine; four 7½-hp. and one 4-hp. motor, 500 volts, d.c.; Approval 475A; March 26.

Dr. Steelman presented the same proposal to the southern group April 14, which also rejected it April 15 in a telegram to Madam Perkins, who previously had stated that "the compromise is fair, reasonable and in the public interest," adding that the proposal was not outside the "hold-the-line" order of the President because a price adjustment to compensate for overtime and other costs already had been granted by the government. Madam Perkins was uncertain, however, as to how many mines were working less than six days a week, whether this proposal would eliminate all other demands and whether Lewis was accepting the principle "as the basis for an agreement" or as an assurance that the miners would be guaranteed 310 days of work a year. She also contended that the operators had made no offers, which the latter countered by reminding her of the proposals to extend the present agreements.

In rejecting the guaranteed working-time proposal, the southern group told Madam Perkins that it was unanimously opposed to the idea of a guarantee of six days' pay per week for the life of the contract with time and a half for all hours in excess of 35. Stating that if present conditions continue, no such guarantee would be necessary but that if anything prevented regular operation six days a week the requirement would bankrupt a large part of the industry, the southern group called attention to the fact that the sixth day now is voluntary on the part of the miners and declared that in many cases failure to work six days was due to refusal by the miners.

"A guaranteed wage is not necessary to insure an adequate production of coal, nor would it be effective for that purpose. Your proposal must be motivated solely by a desire to increase the income of the miners. The unimpeachable record shows that the increase in basic rates for the miners in this field since January, 1941, is substantially in excess of that required under the Little Steel formula and that there are no substandard wages among them. Since your proposed guarantee can have no purpose except to pay for work not performed, it would constitute a clear wage increase for the productive effort of every employee. As such, it is a violation of the stabilization program and the order of the President. The operators have consistently refused to be a party to such a proceeding.

"We beg to suggest that a proper course

would be for you to support us in the sound position we have taken rather than attempt to accomplish a forbidden objective by this indirect and objectionable substitute. We further urge that you give consideration to the President's suggestion that the way to stop granting increases is to avoid trying to find means to evade the prohibition against such increases. This conference is now in its sixth week and it must be obvious to you as it is to everyone here that no agreement can be reached through collective bargaining or conciliation. The operators again urge that without further delay, which might prove costly, you certify this dispute to the National War Labor Board."

April 16 brought a report that the union is against any renewal of the extension agreement, while on April 17 Lewis charged that a conspiracy of politicians and financial interests was responsible for the deadlock. He also charged that the railroads were using thousands of cars for on-track storage in expectation of a "national lockout" of the miners on May 1. These charges, the operators contended, "were unfair and misleading." "If Mr. Lewis is playing on the word 'lockout' as a threat to close the mines on May 1, he should assume the responsibility himself," said Mr. O'Neill. "The operators' committee does not know of any such concerted action on the part of anyone." Along with this, Steelman interjected that he was "becoming slightly impatient" with the progress of negotiations.

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Anthracite Wage Negotiators Report Progress

Anthracite wage negotiations got under way at the Waldorf-Astoria Hotel, New York City, March 31, and up to the time this issue of *Coal Age* was closed there appeared to have been little agreement on any of the points at issue. The first day was taken up with submission of the union's 21 demands, including a $2 a day wage increase (April *Coal Age*, p. 108). The conference then adjourned to permit the operators to study the demands and formulate their reply. John L. Lewis spoke for the union, while Major W. W. Inglis, president, Glen Alden Coal Co., was head of the operators' negotiating committee.

Speaking for the operators, Ralph E. Taggart, president, Philadelphia & Reading Coal & Iron Co., rejected as "impossible of fulfillment" the major demands of the miners when the conference resumed April 2. The wage increase of $2 a day plus the cost of other concessions demanded by the miners would, he declared, increase daily wage payments by $5.25 and cause a rise of $3.52 in the price of domestic sizes. Already, said Mr. Taggart, the miners have received increases in excess of those permitted by the Little Steel formula.

Replying that the miners have to eat, Lewis demanded that the Federal Government subsidize the anthracite industry if necessary to make possible the pay increases demanded.

Subbing down took place when the conference was resumed April 6. The

committee for the operators was made up of J. B. Warriner, Lehigh Navigation Coal Co.; H. J. Connolly, Pennsylvania Coal Co.; James H. Pierce, East Bear Ridge Collieries Co.; James Prendergast, Susquehanna Collieries Co.; C. A. Garner, Jeddo-Highland Coal Co.; and Mr. Taggart.

Preliminary discussions of the various union proposals were completed by April 10, on which date the joint committee of twelve took up the details. By April 14 the question of living costs had been reached and a proposal for a guaranteed wage plan similar to that urged by the miners for the bituminous industry was taken up informally.

Reasonable progress was being made in the negotiations, it was stated April 16, and spokesmen for both the miners and operators were reported to be of the opinion that government intervention was unnecessary.

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Continue Foremen Bill Hearings: Strikes Increase in April

Hearings of the Smith bills to prohibit unionization of foremen and other supervisors, which got under way before the House Military Affairs Committee March 25 (April *Coal Age*, p. 116), continued throughout the early weeks of April. After initial testimony by representatives of the coal industry, a long list of representatives of manufacturing industries testified in opposition, as well as Richard Maize, acting Secretary, Pennsylvania Department of Mines. Opposition witnesses included John McAlpin, president, Mine Officials' Union of America; representatives of the Foremen's Association of America and spokesmen for the railroad brotherhoods. Another was Leo Pressman, counsel for the C.I.O., who said he did not know if the C.I.O. would solicit foremen but saw no objection to them forming a separate union.

The National Labor Relations Board heard argument April 6 for reconsideration of its decision in still another case, that of the Murray Corp., Detroit. In opening the hearings, the chairman announced that because of the importance of the case other parties would be permitted to intervene and that the board would receive briefs from any one interested. Previously, the board had decided 2 to 1 that Murray's supervisory employees were entitled to organization and representation rights.

Increases in earnings of office and supervisory employees on the staffs of a number of coal companies in Ohio and the West Virginia Panhandle by paying time and one-half for overtime were approved by the Cleveland (Ohio) office of the War Labor Board April 5. At the same time, the board turned down requests of several companies which would have involved raises in the straight-time rates of its employees. Companies whose adjustments were approved included: Jefferson Co., Smithfield, Ohio; Warner Collieries Co., Camel Run and Wolf Run, Ohio; Florence Coal Co., Piney Fork, Ohio; Raven Coals, Inc.; Lillybrook Coal Co. and the Raven Red Ash Coal Co.

Beckley, W. Va.; and the Pond Creek Pocahontas Co., Bartley, W. Va. There was no objection, said Dr. Edison L. Bowers, WLB representative, to increased earnings through paying overtime.

The question of draft deferment again popped up as the cause of a strike in April. Approximately 160 men on one shift at No. 3 mine, Rail & River Coal Co., south of Bellaire, Ohio, walked out April 13 because four men had been deferred for occupational reasons. At Cambridge, Ohio, it was reported, employees of the Akron Coal Co. returned to work April 9 after striking for reemployment of a foreman dismissed by the company.

In the Williamson field of West Virginia, six mines were shut down starting April 2 as a result of a demand for overtime pay. The 2,000 men involved were reported, however, to have voted to return to work April 5. Some 900 men struck in the Harlan field of Kentucky April 15, demanding arbitration of disputes which they alleged had been pending for 18 months.

Lance No. 11 colliery, Glen Alden Coal Co., Plymouth, Pa., went down April 12 when some 1,000 men struck over alleged discrimination in placing men.

In Canada, the Drumheller field, in Alberta, was closed by a general strike of 1,015 men at 17 mines April 16 over dismissal of a miner at one property in February following a strike, although such dismissal was approved by the courts. Southern Alberta miners, in addition, began an unofficial movement to work but five days per week. Complaints also were made by miners in Nova Scotia that high income taxes were encouraging absenteeism and reduction in working time. It was stated that in many cases working an extra day put miners in a higher bracket, thus making their net income less than on a 5-day basis.

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Job Shifting Curbed by WMC In 35 Essential Activities

Curbs on changing jobs in 35 essential industries were instituted by the War Manpower Commission in an order effective noon April 18. Under the terms of the order, hiring may be done as follows:

Any employer engaged in an essential activity may hire any new employee not engaged in an essential activity in the preceding 30 days.

Employers may not hire for non-essential work a new employee engaged in essential work in the previous 30 days if the wage or salary rate to be paid exceeds that most recently earned by such employee.

Workers previously engaged in essential activities may be hired for other essential work in areas or industries subject to WMC job-stabilization programs without regard to previous wage or salary rates provided such hiring is subject to and permitted under any approved stabilization program. Otherwise the rate must not exceed that recently earned.

A worker in an essential activity covered by a stabilization program may change his job and receive higher pay under the regulations of such stabilization program

or if he obtains a "statement of availability" from his last employer or WMC (a) whenever he is discharged by his last employer; (b) if he is laid off indefinitely or for a period of 7 or more days; or (c) if he can prove that present employment does not utilize him at his highest skill or that he is not being employed full time.

No worker may accept new employment if the employer is prohibited from employing him under this regulation.

The order does not prohibit a worker from leaving essential work to vacation or do non-essential work for 30 days, after which he can take a higher-paid job in either essential or non-essential work.

Coal mining is defined in the list of essential activities as: "The mining of anthracite, bituminous and semi-anthracite coal, lignite and peat, and the operation of breakers or preparation plants, including also removing overburden and other such activities preparatory to coal-mining operations."

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Jermyn-Green Acquires Two Volpe Mines

Ownership of the No. 6 and Butler collieries of the Volpe Coal Co., Pittston, Pa., has been acquired by the Jermyn-Green Coal Co., making the latter one of the largest independent producers in the anthracite field. Combined output of the two operations, employing about 1,000 men, is estimated at close to 100,000 tons per month. The entire personnel is expected to work for the new management. The Jermyn-Green company, owned by William S. Jermyn and Edward M. Green, is operating under lease with the Pennsylvania Coal Co. the No. 14 colliery at Port Blanchard.

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Face Power and Metallizing Uses Are Mining-Electrical Topics

"Coal mining is the greatest tonnage producer in all industry," declared Phelan MacShane, manager of mining section, Westinghouse Electric & Mfg. Co., in an address at the April meeting of the Mining Electric Group in West Frankfort, Ill., in which he referred to an article by Lee A. Barrett relative to keeping power-conversion equipment in economical distance of the working face. The latter article appeared in the March, 1938, issue of *Coal Age*.

By inference, the working face where this vast tonnage is mined and started on its way to the consumer is where power is most needed. Pointing out that now all producing equipment is on wheels, skids or caterpillars, Mr. MacShane said that power-conversion devices, whether of the rotary or static type, should be mobile so that they may be moved to new locations in a few hours.

This being the trend, the problem of the manufacturer is to construct equipment that may be moved and used under conditions prevailing in the mines. The operator's responsibility is to see that design limits of the equipment, whether at the face or in the substation, are not ruthlessly exceeded.

An outstanding instance of rapid adoption of a new electrical device is furnished by the mercury-arc rectifier. Since the first commercial installation in 1938, 2,000,000 kw. of these units have been installed. Their high efficiency on light loads, the speaker said, is one of the factors responsible for their popularity.

Points about mercury-arc rectifiers and their use brought out in the discussion included: (1) The power factor is about 93; (2) recent improvements have upped efficiency about 2 points; (3) cooling by a thermostatically controlled fan system requires very little water; (4) because of insulation difficulties with negative trolley hangers, present practice is to insulate the rectifier and make the trolley positive; (5) the greatest objection to the pump-type rectifier is the time required to start or restart in case of a power outage; (6) sealed-tube type starts or restarts immediately; tubes carry a three-year guarantee; (7) attempting to start rectifier on low vacuum does no damage; it simply does not start until an ionized condition is set up in the mercury vapor; (8) sealed tubes are of uniform size (a manufacturing advantage); increased capacities are obtained by paralleling tubes; (9) rectifier will carry 200 percent load for one minute; (10) the relative costs of a 300-kw. motor generator, sealed-tube rectifier and pump-type rectifier are about in the order of 15–17–20.

Restrictions and regulations imposed by State law and the Bureau of Mines on the methods of installing oil, Inerteen, Pyranol and air-cooled transformers for underground mining service were touched on by the speaker. Because of the exclusion of organic materials in the construction of air-cooled transformers, except in the varnish, he expressed the opinion that a modification of these restrictions is justified where this type of transformer is used.

Metal Spraying Discussed

At the March meeting, C. M. Barton, engineer for Metallizing Co. of America, spoke on metal spraying. "Metal spraying is not a weld," he declared, "it is strictly a mechanical method of depositing metal." Development of metal spraying extends back over 60 years. Only within recent years has it become a recognized art for laying on protective coatings, for filling holes in castings and for renewing worn surfaces. By experiment it has been learned where it is applicable, what it will do and its limitations.

Sprayed steel has limited tensile strength —7,500 or 8,000 p.s.i. It is porous; so much so that it will carry considerable lubricant. For that reason a sprayed shaft will run "dry" two to six times as long as the parent metal. It will not stand the distortion of buckling, twisting or bending, however. Under such action it cracks and peels off. Partaking of the nature of cast iron, it will not stand shock. Nevertheless, building up crankshafts by spraying is very successful.

Preparation of a shaft for spraying consists of turning off sufficient metal to provide a wearing depth for the sprayed metal, then grooving the bottom of the cut to provide anchorage for the deposit. The grooves or threads are turned as roughly as possible, amounting to a tear. Often the tops of the ridges are knurled to provide a better anchor. Any metal may be sprayed on any other metal. Metal to be sprayed is put up in the form of wire, No. 11 or $\frac{1}{8}$ in. in size. Anything that will go through the spray gun may be used.

Metallizing may be used where there is friction wear or for making press fits. As a protective coating it is superior to galvanizing. One excellent application is the use of stainless steel. Two types are used: one for protection and the other for journal wear. Other successful applications are renewing soft metal bearings, building up the inner surface of ball-bearing housings and in the overhaul of diesel engines of streamlined trains.

Judgment must be used as to where metallizing may apply. A shaft must be strong enough to carry its load without fatigue after it is prepared for spraying. Tests run by the American Railway Association on metallized shafts with 0.1035 steel showed that these ran 2.6 times as long as solid shafts before fatigue was indicated. In another case metallized pistons of an oil engine, using zinc for the spray, increased engine power 15 percent with far less cylinder wear. The wearing qualities of sprayed metals are good, outlasting the parent metal. Sprayed steels of 0.25 carbon or less are finished by turning; harder steels by grinding. The

Hartford Steam Boiler Inspection & Insurance Co. has approved metallizing for renewing the dimensions of crankshafts.

The cost of a metallized shaft is seldom as much as 25 to 50 percent of a new shaft. Some complicated shafts, as a crankshaft from an automobile engine, might cost more than a new one. However, renewing is available while war economy may prevent the purchase of a new shaft.

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Solid Fuels Administration Set up by the President

A Solid Fuels Administration for War, absorbing the old Office of Solid Fuels Coordinator for War, has been set up in the Department of the Interior in a Presidential Executive Order dated April 19. The Secretary of the Interior is designated as administrator and has the power to appoint a deputy. Under the terms of the order, the powers exercised by Mr. Ickes will be substantially similar to those he exercises as Petroleum Administrator for War.

Under the terms of the order, the administrator shall establish "basic policies and formulate plans and programs to assure for the prosecution of the war the conservation and most effective development and utilization of solid fuels," defined as including "all forms of anthracite, bituminous, subbituminous and lignitic coals (including packaged and processed fuels, such as briquettes)."

Mr. Ickes also was appointed to the War Production Board, with which he will work in recommending programs for the distribution of solid fuels to the services and to civilian users. In turn, Mr. Ickes will effect "the proper distribution of such amounts of materials as the chairman of the War Production Board may allot to the solid fuels industries. This was viewed as making the Solid Fuels Administration another "claimant agency" for materials for the coal industry.

Investigation of price schedules and their effect on solid fuels supplies were delegated to the Solid Fuels Administrator, along with the power to make recommendations as to price schedules to the Office of Price Administration. The administrator also is to "be advised of all plans or proposals which deal with the civilian rationing of solid fuels and consult with rationing authorities in the development of such plans or proposals; and determine, after advising with the War Production Board, the areas and times within which such rationing shall be effective and the amount of solid fuels available for such purpose."

Other powers given the administrator include those for the preparation and submission of recommendations for adequate solid-fuels transportation facilities to the Office of Defense Transportation and the War Shipping Administration; also to "request the War Manpower Commission to take such action as it deems appropriate to meet the manpower problems of the solid-fuels industries in the light of the overall manpower needs of the Nation," when such action appears necessary.

Anthracite Bills Offered

Reflecting recent caving and subsidence occurrences in the anthracite region, several bills dealing with the subject have been introduced in the Pennsylvania legislature in recent weeks.

Among the bills aimed at alleviation of cave-ins is one sponsored by Representative Edward Regan (D., Lackawanna) which would make it unlawful to mine hard coal "so as to cause the cave-in, collapse or subsidence" of any public structure or improvement.

S. 470, by Senators Stevenson, Watkins and Coleman, authorizes and creates an Anthracite Mine-Cave Commission within the State Department of Mines. H. 1081, sponsored by Representatives Bretherick and O'Neill, would (1) control a flushing system in worked-out areas; (2) set up a 2c. tax on each ton of anthracite mined to finance the work of flushing; (3) establish a statute of limitations dating from the time of any mine subsidence instead of from date mining first started, to protect those who have agreements with coal companies on damage payments.

S. 471, presented by Senators Stevenson, Watkins and Coleman, would limit the time within which legal actions hereafter begun shall be brought for damages to surface land and property resulting from the mining of coal and operations in connection therewith.

J. Hayden Oliver, vice president, Glen Alden Coal Co., and chairman of the Anthracite Operators' Legislative Committee, said that while hard-coal interests favored passage of measures to set up a three-member subsidence commission to formulate a mine-flushing program, they would present vigorous opposition to the proposed tonnage tax to finance the commission's work.

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Association Activities

MASON COUNTY COAL OPERATORS' ASSOCIATION, with headquarters at West Columbia, W. Va., was organized and incorporated March 3 by operators in that area. The first officers elected were: president, P. W. Fitzpatrick; vice president, R. T. West, general superintendent, West Virginia Coal & Transportation Co.; secretary-treasurer, R. J. Williamson. The officers also are directors of the new organization.

EBENSBURG (PA.) COUNCIL of the Joseph A. Holmes Safety Association has elected officers for the coming year as follows: President, Jerome C. White, J. H. Weaver Co.; vice presidents, John Sloan, Ehrenfeld district, United Mine Workers, and Morgan Watkins, Pennsylvania Coal & Coke Co.; financial secretary, P. Bradley, C. A. Hughes Co.; assistant secretaries, George Resick, Pennsylvania Coal & Coke Co., and Ben Auld, Johnstown Coal & Coke Co.

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Illinois Coals Restudied By Bureau of Mines

In line with its previous republications of analyses of the coals of the various States, the U. S. Bureau of Mines has published Technical Paper 641 (price, 30c.) on the "Analyses of Illinois Coals," to which G. H. Cady contributes notes on geology; A. L. Toenges and E. R. Maize, on methods of mining; T. Fraser, on preparation; R. L. Anderson and J. W. McBride on production, distribution and use, and several others on relation of mine to commercial samples.

Not only are there proximate and ultimate analyses, and calorific values, but ash-softening temperatures, agglomerating characteristics and, for the coal freed of mineral matter, fixed carbon percent dry basis and calorific values on dry and moist basis. Samples analyzed were taken at mines, tipples and at points of delivery. The agglomeration characteristics of coal are recorded as causing poor, fair or good caking.

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Would Control Strip Mining

A bill to bring strip mining of coal under State control in Pennsylvania was introduced in the Senate at Harrisburg during the fourth week of March by Senators John H. Dent (D., Westmoreland) and C. Harold Watkins (R., Schuylkill). The measure would empower the State Secretary of Forests and Waters to issue permits to strip-mining operators on payment of $100 a year for operations covering less than 25 acres and up to $500 annually for tracts comprising 50 acres or more.

Provisions would require operators to submit each year a map describing operations during the preceding year and to plant trees and shrubs on lands denuded by strip operations. Penalties ranging from $250 to $5,000 would be imposed on operators failing to comply with the law. The measure was reported as committed and passed first reading on March 30.

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Off-the-Job Safety the Goal In New N.S.C. Campaign

To combat a major cause of absenteeism in war industries, the National Safety Council, Chicago, has launched "the most ambitious campaign against off-the-job accidents in the history of the safety movement. It is a major part of the council's expanded war-time program to reduce accidents that are hindering the war effort."

As a part of the campaign, the council has produced a new series of publications aimed specifically at off-the-job accidents and based on the techniques and methods that have proved effective through the years in preventing accidents in industrial plants. For educating workers, the material includes a series of six leaflets, twelve special posters dealing with off-the-job hazards, 30 cartoons for employee magazines and two slide-sound films.

Among the materials for management are: a 16-page illustrated pamphlet on the off-the-job safety problem; a data sheet on "Plant Parking Lots and Public Loading Points"; and a six-page folder on "Off-the-Job Safety Meetings."

Operators and Union Oppose Anthracite Silt Bill

At a public hearing on March 30 in Harrisburg, Pa., before the House Public Health and Sanitation Committee, anthracite producers, the United Mine Workers and representatives of residents of the anthracite region united in opposition to House Bill No. 57, introduced in the Legislature by Representative C. H. Brunner Jr., Montgomery County. This measure would amend the existing law by prohibiting dumping of mine silt into streams.

Evan Evans, vice president and general manager, Lehigh Navigation Coal Co., as chairman of the Anthracite Committee on Stream Pollution, said the coal industry needs the help of the State rather than new laws imposing additional burdens. He added that passage of the Brunner measure would "make it impossible to operate at all."

Hobart L. Littell, Anthracite Institute, said that anthracite entering the streams, instead of being a polluting agent, was, as proved by Anthracite Institute research, a superior filtering medium. He pointed out that during the last five years a specially sized anthracite, sold under the trade name of Anthrafilt, has replaced sand and other filtering material in places.

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Personal Notes

SIMON H. ASH has been named to supervise the OCD rescue service program. He will head the section of rescue services in the medical division of the U. S. Office of Civilian Defense. With 30 years' experience in mine inspection and underground safety, Mr. Ash's most recent assignment was to head the mineral production security division of the Bureau of Mines, which was set up soon after our entry into the war to cooperate with OCD in protecting mines and mineral production from sabotage. Mr. Ash will leave almost immediately for England to make a thorough study of the British civilian rescue service and its experience under actual air-raid conditions. On his return he will set up a school for the training of civilian defense rescue officers.

FRANK BAUDINO has been promoted to chief electrician at Orient No. 1 mine, Chicago, Wilmington & Franklin Coal Co., Orient, Ill.

THOMAS BEANEY has been appointed superintendent of the No. 6 and Butler collieries of the Volpe Coal Co., Pittston, Pa., taken over late in March by the Jermyn-Green Coal Co.

JAMES BLAIR, Farraday, Ky., has been made chief engineer for the Elkhorn Coal Co., Kona, Ky., vice Samuel Morey, retired.

WILLIAM BLAIR, formerly connected with the Elkhorn Coal Co., Kona, Ky., has returned after several months in the North to accept a position as mine foreman in new mines at Kona.

C. ARTHUR CARLSON, formerly assistant superintendent of the Spring Canyon Coal Co., Spring City, Utah, has been appointed chief coal mine inspector for the Utah State Industrial Commission. He succeeds R. H. Dalrymple, recently appointed by Governor Herbert B. Maw to be a member of the Commission.

WILLIAM H. CHILDERS, formerly an inspector for the West Virginia Coal & Coke Corp., has been named as manager of the standards department of the Pond Creek Pocahontas Co., Bartley, W. Va., vice Ernest W. Stepp, promoted.

WILLIAM CUTHBERT, formerly with the Pittsburgh Coal Co., has accepted a position as projects engineer for the Valley Camp Coal Co. He began his new duties March 15, and is at Elm Grove, W. Va.

CHARLES CHRISTOPHER, formerly mine foreman for the Consolidation Coal Co., Jenkins, Ky., has joined the Christopher Coal Co., Morgantown, W. Va., in a similar capacity.

ALEX DUNCAN, mine manager for several years at No. 4 mine of the Superior Coal Co., Gillespie, Ill., has been promoted to assistant superintendent.

HERMAN EVERETT, of Charleston, W. Va., who has been sales manager for the Smokeless Fuel Co. for a number of years, has been named president of the Winding Gulf Collieries, Bluefield, vice Lamar Epperly, resigned. E. E. JONES, general superintendent since 1929, has been promoted to general manager, also retaining the duties of general superintendent.

STERLING GOTHARD has been appointed

D. L. McElroy

chief electrician of Mine No. 20, Consolidated Coal Co., Nason, Ill.

FRANK C. HOUT, superintendent of No. 3 mine of the Heisley Coal Co., Nanty Glo, Pa., has been advanced to general superintendent. HOWARD SCHEWENEBRATEN, formerly underground superintendent, has been promoted to superintendent.

HOOPER LOVE, president, St. Bernard Coal Co. and the West Kentucky Coal Co., has been appointed a member of the advisory committee of the recently organized Tennessee Chapter of the Transportation Association of America.

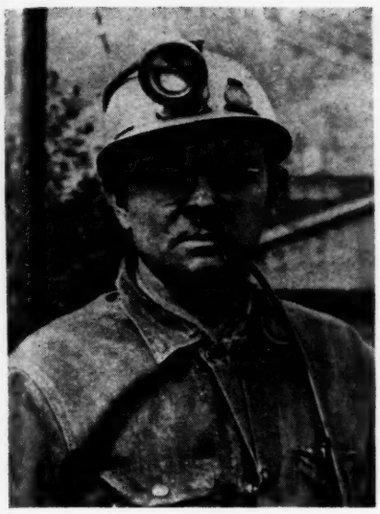
D. L. MCELROY, chief, Coal Section, Mining Equipment Division, War Production Board, leaves May 1 to become chief engineer for the Consolidation Coal Co. A graduate of the West Virginia University School of Mines, Mr. McElroy was assistant director of the mining extension department at W.V.U. for ten years when he resigned July 31, 1938, to become head of the mining engineering department of Virginia Polytechnic Institute. He returned to W.V.U. the following year to become head of the School of Mines until June 30, 1942, when he was granted leave of absence to join W.P.B.

SAMUEL MOREY, 50 years mine engineer for S. L. Bastin, a greater part of the time with the Elkhorn Coal Co., Kona, Ky., of which Mr. Bastin is now president, has retired on a pension.

H. C. RADEBACH, superintendent, Nos. 9 and 11 mines, Red Lands Coal Co., Heilwood, Pa., has been advanced to general superintendent. JOHN C. LOWRY, formerly chief engineer, has been made superintendent.

HUGH M. RICHART has been appointed assistant to Joseph Daffron, chief electrician, Pyramid mine, Binkley Coal Co., Pinckneyville, Ill.

RICHARD ROBERTS, mine foreman for Glen Alden Coal Co. at the Buttonwood colliery, Wilkes-Barre, Pa., has been transferred to Huber No. 20, Ashley, Pa. With



Ernest G. Schell

his departure he was given a testimonial dinner and presented with a pen and pencil set by his fellow employees. He has been in the company's employ 25 years.

ERNEST G. SCHELL, superintendent of Blaine mine of the Lorain Coal & Dock Co., Blaine, Ohio, has been appointed general superintendent, effective April 1.

ERNEST W. STEPP, manager of the standards department, Pond Creek Pocahontas Co., Bartley, W. Va., has been appointed superintendent of No. 4 mine, Raysal. He succeeds DENNIS K. SCOTT, who resigned to accept a position in La Paz, Bolivia.

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New Development Started By Red Jacket

The Red Jacket Coal Corp. is starting a big development at Coal Mountain, in Wyoming County, West Virginia, which when completed will increase the company's daily output from 700 to 3,000 tons. Located on Cub Creek, Coal Mountain is about 35 miles from Pineville. It is understood that the company has about 15,000,000 tons of minable coal in this lease. The company is now mining the Powelton seam at Coal Mountain, but the new development is in the Dorothy and Cedar Grove seams.

Construction of a new tipple, adjacent to the present structure, is already under way. Because of the scarcity of steel, the new tipple will be built of treated wood. Three additional tracks are to be constructed to serve the existing tipple, making available a total of five tracks under each structure. Aerial tramways will bring the coal from the Dorothy and Cedar Grove seams to the new tipple.

There are now about 75 or 80 homes at Coal Mountain, but many additional homes will be constructed to provide living quarters for workers at the new operation. The Red Jacket company has one other big operation in Wyoming County a short distance below Pineville, but the new development is designed to be much larger than the one at Wyoming.

Hellier Co. Acquires Tract Of Kentucky Coal Land

The Hellier Coal & Coke Co., Louisville, Ky., recently organized, has acquired the holdings of the Chicago By-Product Corp., embracing more than 4,000 acres on Marrowbone Creek, near Hellier, Ky., in Pike County. It also is on the Chesapeake & Ohio Ry. The deal also includes several hundred coke ovens formerly owned by the Allegheny Coal Co.

C. S. B. Ward, Pittsburgh, Pa., president, said the Hellier company had contrated with the United States Steel Corp. for all the coke it could produce. The treasurer is W. C. Holtzworth, president, Strothers Iron & Steel Co., Youngstown, Ohio. The general superintendent is E. T. Adams, Pittsburgh, Pa. Reports were that more than half a million dollars will be spent in development of the property.

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N. & W. Fuel Dept. Holds 16th Annual Meeting

Attended by officials of the company and prominent visitors, the Norfolk & Western Ry. fuel department held its 16th annual safety meet and banquet March 27 in the Mountaineer Hotel, Williamson, W. Va. O. W. Evans, general superintendent of the fuel department, presided, and talks on safety were delivered by department heads and visitors. Special commendation was accorded E. E. Morrison, who as general mine foreman operated the company's Howard colliery, Chattaroy, W. Va., for nine years without a fatality.

Among those present were: H. B. Smith, and C. B. Blair, N. & W. division superintendents; Howard Oster, federal mine inspector; Walter Hornsby, Kentucky State inspector; E. E. Ritter, president and general manager, Red Jacket Coal Corp.; W. E. Davis, superintendent, Howard colliery; E. S. Hamilton, superintendent of the company's Pond Creek colliery, Leckieville, Ky.; P. J. Winn, assistant superintendent, Pond Creek; F. G. Jackson, chief engineer; C. S. Black, general store manager, and C. J. Flippen, safety director, N. & W. fuel department.

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Clinchfield Adds Motive Power

Supplementing existing power to maintain service, the Clinchfield R.R. has purchased eight new locomotives of the 4-cylinder, simple, articulated type. Built by the American Locomotive Co., they are among the largest, most modern and speediest freight units now in service east of the Mississippi River, having 22x32-in. cylinders, 69-in. driving wheels, tractive power of 101,120 lb.; length over all, 119 ft. 3¼ in.; boiler pressure, 265 lb.; total weight of engine and tender, 1,003,300 lb.; coal capacity of tender, 26 tons; water capacity of tender, 22,500 gal.; engine bearings, Timken roller; tender bearings, plain AAR type.

Oil From Coal Looms Larger in Future; Flow of Both to East Strengthened

COAL AND OIL both in the future and today was the subject of increasing attention in past weeks. Along the line of the conclusions presented by Secretary of the Interior Ickes in the April issue of *Coal Age*, a growing number of students of the fuel problem called attention to oil's ticklish reserve position and urged investigation of the possibilities of liquid fuel from coal and oil shale. And one oil company, in cooperation with the Bureau of Mines, began actual burning tests with colloidal fuel.

The possibility that oil soon will have to be abandoned for common heating purposes was predicted by Dr. Benjamin T. Brooks, consulting chemist, New York City, in a report at the 105th meeting of the American Chemical Society, which opened in Detroit April 12. Dwindling petroleum resources was given as the reason. The abandonment would be permanent and a part of a general petroleum curtailment which the war threatens to hasten.

"Part of our future gasoline and oil supply, and eventually practically all of it, will have to come from coal," R. C. Tucker, assistant geologist, State of West Virginia, told the eastern division of the American Petroleum Institute division of production, at a meeting April 9 in Pittsburgh, Pa. Speaking on the "Future Oil and Gas Supply in Eastern United States," Mr. Tucker said in part: "The gas companies may have to go into the coal business whether they like it or not. We have reserves of coal which will last several hundred years, so we are not likely to have to stop using gasoline and oil, although we will have to pay much more for these products when that time comes. We may also have to use bottled gas for domestic purposes."

The petroleum discovery rate has become of increasing concern to oil companies and others interested in the fuel supply. At present, this rate is less than one-third of consumption, and has been reflected in greatly increased interest and effort in the field of wildcatting. And the Department of Commerce, in a recent "Domestic Commerce" bulletin, pointed out that "before the war, both anthracite and bituminous coal had been losing ground to petroleum, natural gas and water power, and anthracite besides had been losing to bituminous. Reconversion to coal, induced by the fuel-oil shortage in the East, has permitted anthracite and bituminous to regain a portion of the fuel market lost in the past decade, but to what extent this recovery will be permanent is a question for the future.

Coal May Do Better

"Competition from water power is not likely to decrease. However, continued experimentation with stokers and other mechanical firing equipment may produce devices that will reduce the advantage hitherto quite obviously held by fuel oil. If convenience in the use of coal can be made to approach more closely that of fuel oil, the lower delivered cost of coal in the eastern markets may act to restore to coal a greater portion of the consumer demand."

Following the initiation of negotiations about a year ago and a meeting of representatives of leading oil companies in September, 1942, at which the idea was approved, "exhaustive tests to develop a fuel composed of a mixture of oil and coal" have been begun at the Point Breeze refinery of the Atlantic Refining Co., Philadelphia, the Department of the Interior announced April 13.

The tests are designed "to determine, among other things, the various types of boilers and furnaces in which the colloidal fuel may be used, taking into consideration the combustion space, the size of the passages, the amount of ash in the coal and the fusion temperature of the ash; also, the best methods of removing ash from the boilers and furnaces." Under the agreement for conducting the tests, the government has supplied the necessary powdered coal and oil and the oil company has contributed the use of its facilities and research department. The data obtained will be assembled by the Bureau of Mines. Supervising the tests in behalf of the Bureau is Dr. W. C. Schroeder, assistant chief, fuels and explosives service; directing technical experimentation for Atlantic Refining, Dr. Arthur B. Horsberger.

The mixtures used in the experiment contain approximately 60 percent oil and 40 percent pulverized bituminous coal with a relatively low ash content. "The greatest

Early Starter

E. M. Davis Jr., shown here at the age of six months, starts early to give evidence of mighty deeds in coal mining when he gets his growth. He is the son of E. M. Davis Sr., superintendent, Elk Creek Coal Co., Amberstdale, W. Va., and nephew of J. E. Davis, general superintendent, Guyan Eagle, Buffalo-Chilton and Elk Creek coal companies and the Winisle Coal Corp.

problem is to establish a mixture which will prevent the settling of coal particles and a consequent separation of oil and coal components. It is pointed out that the mixing could be done in central mixing plants and the fuel delivered to consumers just as fuel oil now is delivered."

Bearing more directly on today's situation, movement of both oil and coal to the East showed a jump in April, although efforts to increase the flow of both continued unabated and included the announcement of the 1943 coal-stocking campaign described elsewhere in this news section. All-rail coal movement into New England for the week ended April 3 was the second highest in 1943 and the fourth highest on record, according to an announcement by the Solid Fuels Office.

A new all-time record for tank-car shipments to the East (912,919 bbl. of petroleum products) also was hung up the week ended April 3, at which time it was announced that industrial conversions to date were saving oil at a rate of 107,000 bbl. per day. A steady increase in oil movement was forecast by Joseph B. Eastman, director, Office of Defense Transportation, in a statement released April 13. Including all pipelines, tank cars, barges and Lake and Gulf tankers, he projected deliveries into the 17 eastern states as follows: Second quarter, 1943, 1,271,000 bbl. daily; third quarter, 1,458,000 bbl.; fourth quarter, 1,547,000 bbl.; first quarter, 1944, 1,611,000 bbl. No tanker movement to Atlantic Coast ports was counted upon.

Foresee Rationing Continuation

Little possibility of lifting rationing restrictions was foreseen for the coming winter season, however. This was the sense of a statement April 3 by Petroleum Administrator Ickes. That same day, it also was announced that the entire petroleum supply and distribution system in the Middle West would be reshuffled to release more transportation equipment for the East; that the 20-in. products line would be extended to the East Coast; that more facilities would be completed for unloading oil along the east coast and thus cut down the turn-around time for tank cars; and that oil would begin to flow from the Virginia end of a 1,214-mile pipeline system from Texas within ten days.

Extension of the 20-in. products line, with a daily capacity of 235,000 bbl., most of which is expected to go to the military services, was approved by the War Production Board early in April. Meanwhile work was pushed on the eastern leg of the 24-in. Texas-Norris City, Ill., line, and on March 30 completion of the western leg was announced with the installation of the pumping stations at Lick Creek and McClure, Ill. Completion of the eastern extension of the Texas-Seymour, Ind., products line was set for the end of the year, with 70 percent of its deliveries forecast for December.

Orders restricting the consumption of fuel oil for non-heating purposes by commercial and industrial consumers and government agencies in the eastern seaboard shortage area were permitted to expire April 1, however. Under the terms of this

order, less-essential users had been cut 40 percent. On April 4, OPA announced that the use of fuel oil in the 17 eastern states and the District of Columbia had been cut to 60 percent of normal in the six months from Oct. 1, 1942, to March 31, 1943. Demand in this period, it was stated, normally is 115,500,000 bbl.

Orders issued to stimulate conversion and increase coal movement included that by ODT March 31 suspending until further notice the requirement for permits for certain movements of coal on the Atlantic Seaboard; easing of the cargo weight limit restrictions for rate purposes to stimulate barge movement of coal from New York to New England, announced by OPA April 1; broadening of the list of those eligible to purchase stoves by OPA March 25; release of householder sizes of centrifugal boosters or underfire fans in the hands of dealers for distribution, effective March 31, by the War Production Board; and redefinition of the term "Class A Stoker" by the WPB April 13. Such stokers now are defined as units with grate areas of 36 sq.ft. or less and coal-feeding capacities in excess of 60 lb. per hour.

Calling attention to a sharp reduction in the production of fuel wood, Solid Fuels Coordinator Ickes early in April urged wood cutters to increase their output to eliminate the threat of a substantial increase in the demand for coal this coming winter. The critical areas were designated as the northeastern and Middle Atlantic States, the Lake states and the far western states.

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West Kentucky Co. Merges Offices at Earlington

Further consolidation of offices of the West Kentucky Coal Co. has been effected with the transfer of the central office of the company from Sturgis, Ky., to Earlington. The Sturgis office had been maintained for 39 years. In November, 1941, key workers at Paducah, Ky., were transferred to Earlington. Ralph E. Dudley, vice president, who headed the Sturgis personnel, joined the company when it purchased the St. Bernard Coal Co. properties in 1924.

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Plymouth Mine Closed

Plymouth mine, at Plymouth, Putnam County, W. Va., was closed April 1 by the owner, the Hatfield-Campbell Creek Coal Co. W. C. Mitchell, general superintendent, who has been employed at the property for 53 years, will continue to reside at Plymouth to supervise pulling the steel, selling the equipment and caring for the remaining property, which includes some unmined acreage.

The mine, a drift operation opened in 1887 prior to the coming of the railroad and which had retained the original 30-in. gage and 550-volt power, was in the Pittsburgh No. 8 seam and was the shipping operation farthest north in the Kanawha field. It shipped by New York Central R.R. and by barges on the Kanawha River.

P. C. Thomas

P. C. Thomas Is Dead

P. C. Thomas, 55, vice president of Eastern Gas & Fuel Associates in charge of operations of its Koppers Coal Division, died April 19 after several months' illness of a heart ailment.

Perry Critchley Thomas joined the Koppers Coal Co. in 1928 as manager of mines and later became vice president and general manager. He was named vice president in charge of coal operations when the company was made a division of Eastern Gas & Fuel Associates.

Born in Scranton, he entered the anthracite industry in early youth and was successively associated with the Temple Iron Co., Scranton, Pa., the H. C. Frick Coke Co., Scottdale, Pa., in the engineering department; and the New River Co., Mount Hope, W. Va., as chief engineer, later superintendent and then general manager. In 1919 he had charge of opening the Helen (W. Va.) mine for the East Gulf Coal Co. and in 1926 he became general manager of the New River & Pocohontas Consolidated Coal Co., belonging to the Berwind-White Coal Mining Co.

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West Virginia Pioneer, John Laing, Dies

John Laing, 77, a leader in the development of West Virginia's coal industry, and former chief of the State Department of Mines, died April 16 at a Charleston (W. Va.) hospital. He was president of the Wyatt Coal Co., which operates four mines in Cabin Creek; the Wyatt Coal Sales Co., Morrison Coal Co., Beckley Fire Creek Coal Co. and the MacAlpin Coal Co. He also was president of the Virginia Savings & Loan Co. and the Title Mortgage & Discount Co.; vice president of the Virginian Joint Stock Land Bank, and a director of the Kanawha Valley Bank.

A native of Glasgow, Scotland, he came to this country with his parents when a year old. He began work in the mines of Mercer County, Pennsylvania, at the age of 9. In 1878 he and his father went to Fayette County, West Virginia, where

they were employed in the mines until late the following year. They then returned to Pennsylvania, but four years later went back to West Virginia.

Mr. Laing organized the Wyatt Coal Co. in 1906 and began developing the interests he supervised at his death. He was chief of the State Department of Mines from 1908 to 1913.

•

Birmingham Names Group To Aid Smoke Abatement

A committee representing the Alabama Mining Institute has been appointed by I. W. Rouzer, president, to assist in the Birmingham (Ala.) smoke abatement program this summer. The group named is composed of Harold McDermott, J. H. Moore, David Roberts Jr. and R. T. McDaniel. A combustion engineer of wide experience is to be called upon for consultation.

City Commissioner J. A. Morgan said the committee could be particularly helpful in showing domestic and industrial coal users the particular type of coal they should purchase for their equipment so as to eliminate as much smoke as possible.

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Blue Diamond Co. Develops New Virginia Operation

Blue Diamond Coal Co., headed by Alexander Bonnyman, with mines in Virginia, Tennessee and Kentucky and headquarters at Knoxville, Tenn., plans a new development in Dickenson County, Virginia, as an extension of its Toms Creek lease. The Carolina, Clinchfield & Ohio R.R. is reconditioning several miles of its Nora branch, to which it will add 1¼ miles of track extending to a new tipple being built on the property being developed.

Charles B. Jackson Jr., Big Stone Gap, general manager in charge of construction work for Blue Diamond, is directing the work of development.

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Coal-Mine Accident Fatality Rate Registers Sharp Upturn

Accidents at coal mines of the United States caused the deaths of 160 bituminous and 14 anthracite miners in February last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors.

With a production of 48,920,000 net tons, the accident death rate among bituminous miners was 3.27 per million tons, compared with 1.62 in February, 1942.

The anthracite fatality rate from accidents in February last was 2.75, based on an output of 5,092,000 tons, against 4.82 in the second month of the preceding year.

For the two industries combined, the accident fatality rate in February last was 3.22, compared with 1.93 in the corresponding month a year earlier.

Fatalities during February last, by causes and states, as well as comparable rates for the first two months of 1942 and 1943 are as follows:

UNITED STATES COAL-MINE FATALITIES IN FEBRUARY, 1943, BY CAUSES AND STATES

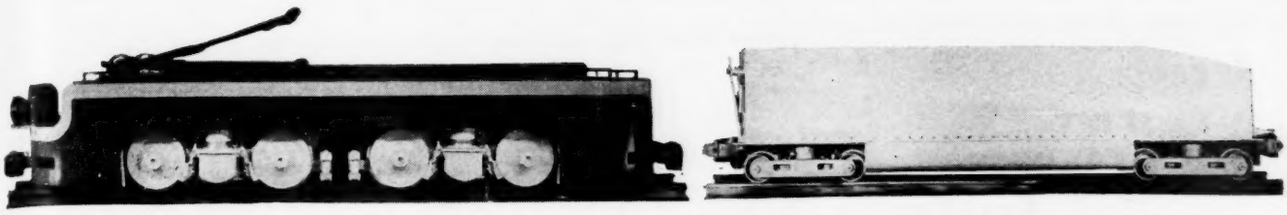
State	Underground: Falls of Roof	Falls of Face	Haulage	Gas or Dust Explosions	Explosives	Machinery	Other Causes	Total Underground	Shaft	Open-cut	Surface	Grand Total
Alabama	2	..	2	..	..	..	..	4	..	..	..	4
Arkansas	1	..	..	..	..	..	..	1	..	..	..	1
Illinois	3	1	4	..	1	..	..	9	..	2	..	11
Kansas	..	..	..	..	1	..	..	1	..	..	..	1
Kentucky	5	..	2	..	3	..	..	10	..	..	..	10
Montana	2	..	..	74	..	..	..	76	..	..	..	76
New Mexico	2	..	..	..	..	..	..	2	..	..	..	2
North Dakota	..	..	..	..	..	..	..	..	..	1	..	1
Ohio	1	..	..	..	1	..	..	2	1	1	..	4
Penna. (bit.)	12	..	6	..	..	..	..	18	..	..	..	18
Tennessee	..	..	1	..	..	..	..	1	..	..	..	1
Utah	1	..	..	..	..	1	..	2	..	..	..	2
Virginia	3	..	2	..	..	..	..	5	..	..	..	5
West Virginia	13	1	7	..	..	1	..	22	..	..	1	23
Wyoming	1	..	..	..	..	..	..	1	..	..	..	1
Total bituminous	46	2	24	74	6	2	..	154	1	4	1	160
Pennsylvania anthracite	8	..	3	..	1	..	1	13	..	1	..	14
Grand total	54	2	27	74	7	2	1	167	1	5	1	174

DEATHS AND FATALITY RATES AT U. S. COAL MINES, BY CAUSES OF ACCIDENTS*

January-February, 1942 and 1943

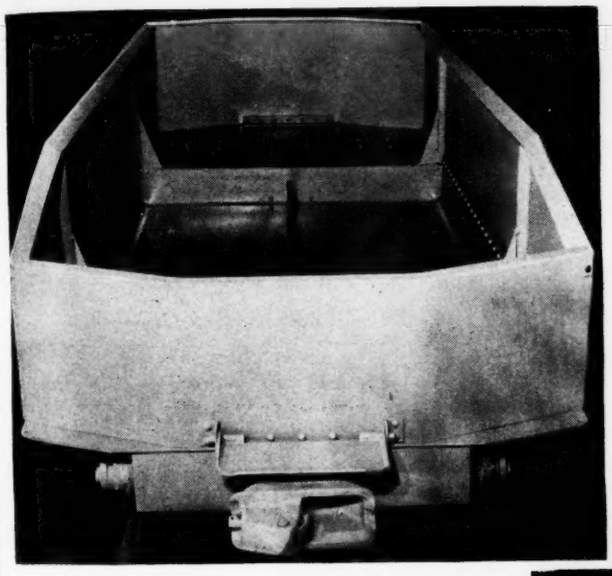
Cause	Bituminous: Number Killed		Killed per Million Tons		Anthracite: Number Killed		Killed per Million Tons		Total: Number Killed		Killed per Million Tons	
Underground:	1942	1943	1942	1943	1942	1943	1942	1943	1942	1943	1942	1943
Falls of roof and coal	105	102	1.136	1.063	24	9	2.580	0.956	129	111	1.268	1.054
Haulage	40	37	.432	.386	5	6	.537	.638	45	43	.442	.408
Gas or dust explosions:												
Local	...	3	....	.031	2	....	.215	....	2	3	.020	.029
Major	34	74	.368	.771	....	....	....	....	34	74	.334	.702
Explosives	2	7	.022	.073	2	2	.215	.213	4	9	.039	.085
Electricity	5	2	.054	.021	2	....	.215	....	7	2	.069	.019
Machinery	2	4	.022	.042	....	....	....	....	2	4	.020	.038
Shaft	2	2	.022	.021	....	....	....	....	2	2	.020	.019
Miscellaneous	2	13	.022	.135	....	2	....	.213	2	15	.020	.142
Stripping or open-cut	3	9	.032	.094	....	1	....	.106	3	10	.030	.095
Surface	8	8	.087	.083	3	2	.322	.213	11	10	.108	.095
Grand total	203	261	2.197	2.720	38	22	4.084	2.339	241	283	2.370	2.686

*All figures subject to revision.



Pulling together for low costs

DIFFERENTIAL
AXLESS LOCOMOTIVES & CARS

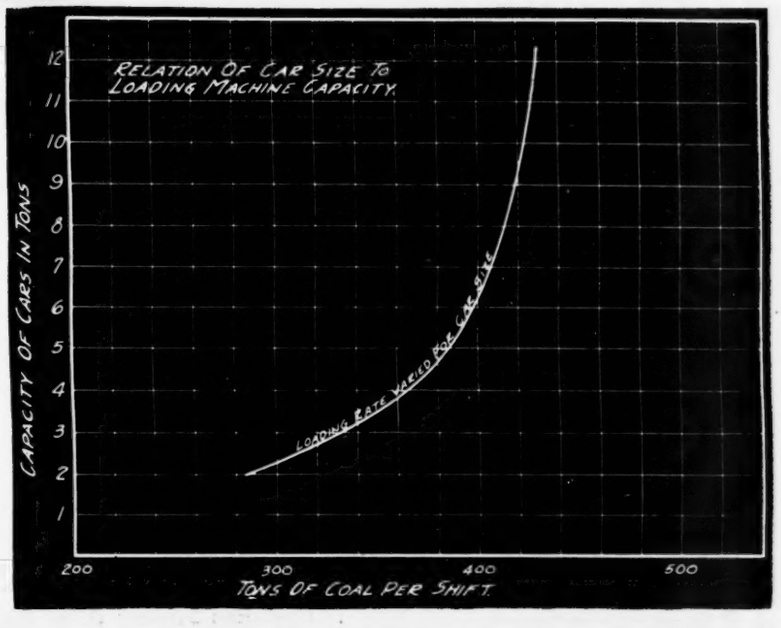


• This modern locomotive with AXLESS trucks provides greater traction—power on all eight wheels — and more horsepower — which enables it to haul larger loads at higher speeds.

The mine car with AXLESS trucks provides greater carrying capacity within a limited height — saves weight — equalizes wheel loading—reduces flange and tread wear—rides smoothly—eliminates costly spillage—is ruggedly constructed.

Write for full descriptive bulletin.

The curve shown in the chart clearly indicates that increasing the size of the mine car will increase the loading machine capacity and consequently decrease the cost per ton. While the large mine car offers many other cost reducing possibilities its main advantage is the increase in tonnage per machine shift. This curve was developed under a set of actual mining conditions and probably is about average for mechanical mining. A different set of conditions would give different results but the relation between mine car size and tons per shift would remain very nearly constant.



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Discuss Sick Absenteeism In Industry

A report of a study of sick absenteeism in industry was released March 22 by the Industrial Hygiene Foundation, Pittsburgh, Pa. The study, which began Jan. 1, 1941, in collaboration with member companies of the Foundation and with the U. S. Public Health Service, included a panel discussion of reduction of absenteeism at the Foundation's annual meeting, Nov. 10–11, 1942. The six participants in the panel have since amplified their discussions of the different phases of the subject. A feature of the report, entitled "More Manpower Through Reduction of Absences," is a section on "Absenteeism in the Coal-Mining Industry," by Dr. R. R. Sayers, Director, U. S. Bureau of Mines, and medical director, U. S. Public Health Service.

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Revised Coal Cost Reports Show Minor Changes

A revised compilation of cost reports from producers to the Bituminous Coal Division made public March 27 showed only minor changes in the weighted average costs of producing coal during the 12-month-period Oct. 1, 1941, through September, 1942, as shown in the preliminary compilation announced last February (*Coal Age*, February, 1943, p. 132).

The weighted average cost per ton in District 9, western Kentucky, shown in the preliminary compilation as $1.5571, was revised to $1.5570; the cost for District 10, Illinois, was revised from $1.7205 to $1.7204; District 19, Wyoming and Idaho, from $1.9845 to $1.9841, and Price Area 7, composed of Districts 19 and 20, was revised from $2.0667 to $2.0994. The weighted average cost figures for all other districts remain unchanged.

•

W. E. Wrather Named to Head Geological Survey

Acting on recommendation of the National Academy of Sciences, President Roosevelt on April 9 nominated William E. Wrather, Dallas, Texas, noted petroleum geologist, to be director of the U. S. Geological Survey. Mr. Wrather, who for the last few months has been serving as associate chief of the Metals and Minerals Division of the Board of Economic Warfare, was named to succeed Walter C. Mendenhall, who retired in February after 12 years as director and 48 years of service with the Survey. A consulting petroleum geologist in Dallas for the last 25 years, Mr. Wrather, who is 60, has served as geology professor at the universities of Chicago, Northwestern, Yale and Texas.

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Resumes Mining After 20 Years

After more than two decades of inactivity the Standard Hocking Coal Co., Crooksville, Ohio, which for many years operated Rends mine, has been reorganized and is preparing to resume operations. Clean-up and repair work are under way. Principals in the new firm are: N. B. Snell, Crooksville; C. E. Shriner, Gnadenhutten; Robert Essex, Pataskala, and George Hayden, Newark, Ohio.

•

War Production Training Corps For Utah Miners Expanded

Following a conference in April with federal and local leaders, H. B. Gunderson, Utah State Supervisor of Vocational Education, began to lay plans for expanding a war production training corps for coal miners in Carbon County, Utah. According to J. M. Naylor, director of war production training for the county, "the results of the program are being felt already." Because of the labor shortage, mine operators view it as absolutely essential not only to increase miner efficiency but to train men for certification as firebosses and mine foremen. Mr. Naylor was for 15 years master mechanic for the Utah Fuel Co.

To date classes have been conducted in four mines but expansion plans contemplate training for all miners who request it. According to Mr. Naylor, tracklaying and timbering skill has increased as much as 50 percent as a result of the classes held, and coal production is up.

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Bethlehem Buys 2 Consol Mines

Consolidation Coal Co. has sold its No. 86 mines, at Carolina and Idamay, W. Va., to the Bethlehem Steel Co. The property consists of a modern tipple at Carolina and about 6,000 acres of low-sulphur Pittsburgh seam coal, which Bethlehem will use in steel manufacture.

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Obituary

JAMES MARTIN, 69, vice president and general manager of the MacAlpin Coal Co. and Wyatt Coal Co., died April 9 of a heart attack at his home in Charleston, W. Va. He also managed other mines of the Laing interests and was a stockholder in several mining companies of the State. Born in Scotland, he came to this country when 18 and started work in the mines at Royal, W. Va. For a time he was State mine inspector in the Seventh district.

FORREST M. MCDANIEL, 53, chief engineer for the Dawson Coal Co., Clarksburg, W. Va., died April 13 as the result of an illness suffered during a business trip. He also was chief engineer for about 20 years for the West Virginia Northern R. R. and was a consultant for the I.C.C.

RAY S. WEIMER, general manager, Northern Illinois Coal Corp., Wilmington, Ill., died April 17.

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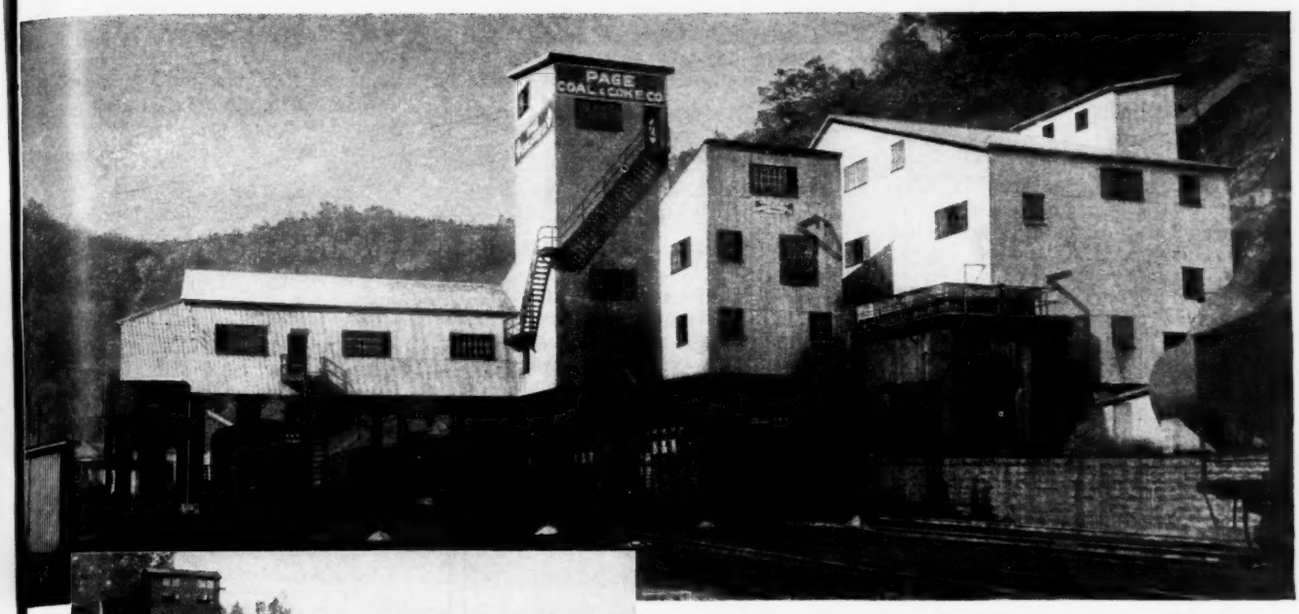
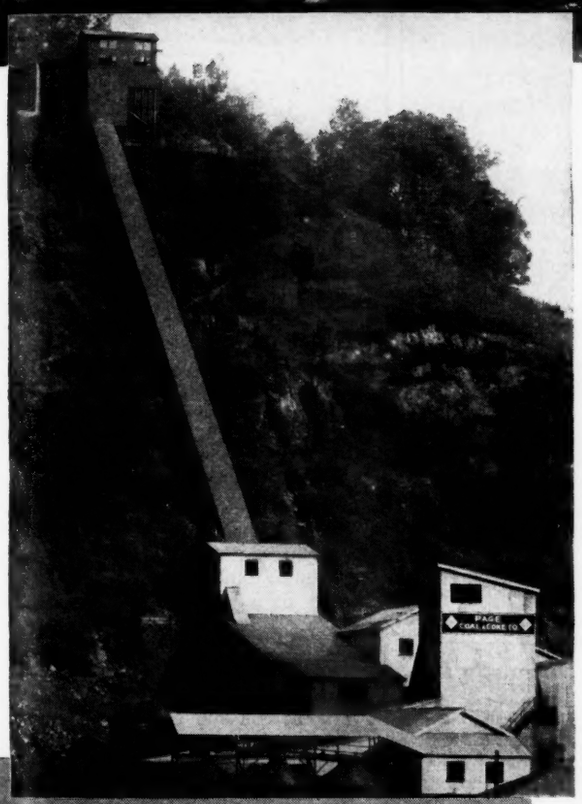
New Preparation Facilities

AMERICAN BRIQUET CO. (Ecco Mfg. Co.), Pine Grove, Pa.—Contract closed with Deister Concentrator Co. for five SuperDuty coal-washing tables and one Concenco revolving feed distributor, 8-way split, to treat No. 4 buckwheat.





R AND S PLANT OF PAGE COAL & COKE CO. AT PAGETON, W. VA.

Raw coal delivered to the preparation plant on a retarding conveyor is screen sized on Marcus horizontal screens, and the larger domestic sizes are hand-picked. Lump coal may be loaded or be crushed and returned for re-sizing. Minus 7" coal is screened into 7" x 3", 3" x ¾" and ¾" x 0. The two larger sizes are washed in two tandem-type Hydro-Separators and the ¾" x 0 is by-passed unwashed. Washed coal is dewatered on a Parrish-type shaking screen, and loaded by sizes. Refuse material is delivered to the return strand of the retarding conveyor and dumped. Accessory crushing and screening equipment permits preparation of stoker coal from the larger washed nut coal sizes.

Another MINE IS READY WITH A MODERN PREPARATION PLANT

Now's the time—to make sure that your coal will be fully able to take good care of itself in the inevitable post-war selling battle. Now's the time—to get your plans completed for an adequate, modern preparation plant. There's no better, sounder assurance that you'll get your share of the profitable business in days to come.

This Page Coal & Coke Company plant is an example of how many shrewd operators, alive to the necessities of tomorrow, have turned to Roberts & Schaefer Company—in search not merely of coal cleaning equipment, but of the skill, practical knowledge and broad experience that knows how to solve a specific individual problem.

You find in the Roberts & Schaefer organization a practical human answer to technical equipment problems. A Roberts & Schaefer plan is sturdy assurance of a preparation plant that is sound in principle, adequate and efficient in performance, and economical in results.

Getting in touch with this group of coal preparation specialists is a wise step toward insuring a profitable future for your property.

Write us for a helpful booklet—

"HOW TO MAKE YOUR COAL WORTH MORE"

R AND S COMPANY

ROBERTS and SCHAEFER CO.

307 North Michigan Avenue, Chicago

P. O. Box 865, PITTSBURGH, PA. | 1711 Connecticut Avenue, N. W., WASHINGTON, D. C. | P. O. Box 570, HUNTINGTON, W. VA.

EQUITABLE FUEL CORP., Dunmore, Pa.—Contract closed with Deister Concentrator Co. for three SuperDuty No. 7 coal-washing tables to handle No. 4 buckwheat.

IMPERIAL SMOKELESS COAL CO., Quinwood, W. Va.—Contract closed with Kanawha Mfg. Co. for two Kanawha-Belknap coal washers and accessories to clean egg and stove coal; capacity, 100 tons per hour.

JONATHAN COAL MINING CO., Deibler, Pa.—Contract closed with Deister Concentrator Co. for two SuperDuty No. 7 coal-washing tables to treat No. 4 buckwheat.

LOCUST COAL MINING CO., Shenandoah, Pa.—Contract closed with Deister Concentrator Co. for one SuperDuty No. 7 coal-washing table to treat No. 5 buckwheat.

MINERAL SPRING COAL CO., Mineral Spring Breaker, Wilkes-Barre, Pa.—Contract closed with Finch Mfg. Co. for one 4-ft. Menzies cone to clean No. 5 buckwheat (3/64x30m.); feed capacity, 22 t.p.h.

PEERLESS COAL & COKE CO., Vivian, W. Va.—Contract closed with Kanawha Mfg. Co. for mine-run equipment consisting of 500-ton concrete-stave bin with lowering chute, 48-in. reciprocating feeder, 60-in. apron picking table and crusher; capacity, 400 t.p.h.

RALEIGH-WYOMING MINING CO., Edwight, W. Va.—Contract closed with Kanawha Mfg. Co. for Kanawha-Belknap coal washer to clean 3x$\frac{3}{4}$-in. coal complete with dewatering screens and refuse conveyors in steel structure; capacity, 125 t.p.h.

T. F. STEEL COAL CO., Junedale, Pa.—Contract closed with Deister Concentrator Co. for one SuperDuty Diagonal-Deck No. 7 coal-washing table to handle No. 1 buckwheat.

SUSQUEHANNA COLLIERIES CO., Glen Burn Colliery, Shamokin, Pa.—Contract closed with Wilmot Engineering Co. for one 12-ft. classifier with Wilmot high-speed dewatering screen to prepare No. 5 buckwheat coal; capacity, 20 tons of clean coal per hour.

Meeting Held to Promote Beehive Coke Output

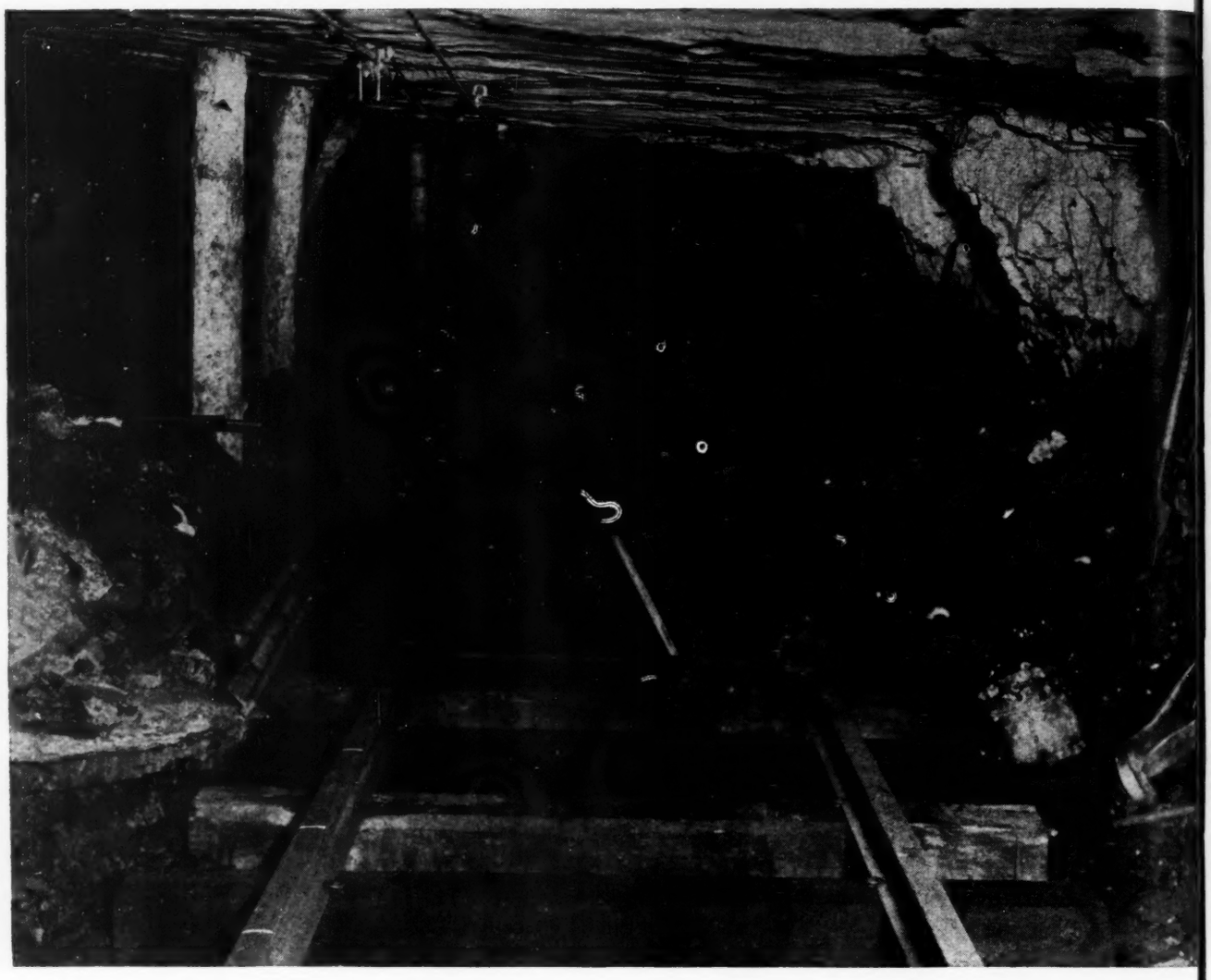
Promoting the increased production of high-quality coke for the nation's blast furnaces, the U. S. Bureau of Mines sponsored a meeting of beehive-coke-oven operators of Fayette and Westmoreland counties, Pennsylvania, April 16 in the Fayette County Courthouse, Uniontown, Pa.

Speakers included Harlen M. Chapman, Assistant Deputy Coordinator of Solid Fuels for War; Samuel Weiss, Chief of the Fuels Section, Raw Materials Branch, WPB; L. D. Schmidt, Pittsburgh, Pa., engineer in charge of the Bureau of Mines' coke-production survey, and J. C. Barrett, a blast-furnace operator. Wiley Byers, Uniontown business man, who was production manager for the U. S. Fuel Administration for the Connellsville coke area during the last war, was chairman.

Secretary of the Interior Ickes, who also is Solid Fuels Coordinator for War, said the meeting emphasized the increasing importance of beehive coke to steel production and the need for maintaining a steady output of high-quality coke from the important Fayette-Westmoreland area, the world's largest producer of beehive coke.

"Without extended government subsidies or grants," Mr. Ickes added, "the Fayette-Westmoreland area has increased its output of coke and today it provides virtually all the beehive coke used in blast furnaces of the United States. Steady production of high-quality coke in this field is necessary if steel mills are to reach their goal of 97,000,000 tons annually. High-ash coke will slow pig-iron production and high-sulphur coke will result in lower quality iron and increase operating difficulties of blast furnaces."

Secretary Ickes pointed out that the Bureau of Mines maintains a specially equipped mobile laboratory in the region to assist beehive operators in solving operating problems. The truck, which visits various beehive yards, makes rapid analysis of coal and coke samples to facilitate the production of high-grade metallurgical coke of uniform quality.



laying new track with treated ties that resist decay—

CUTS MAINTENANCE COSTS

"CZC"-TREATED WOOD CHECKS DECAY—SAVES MANPOWER—ADDS SAFETY!

Man-hours spent in repair and replacement of tracks can be greatly—and safely—reduced when Chromated Zinc Chloride-treated ties are used.

"CZC"-treated ties last many times longer than untreated ties because they resist decay. They have measurable, fire-resistant qualities—they are odorless and clean to handle. Important, too, is the fact that their cost is rapidly repaid by eliminating early and frequent replacements. And still another cost-saving feature—"CZC"-treated ties which have been damaged mechanically may be used for permanent cribbing, posts, and lagging.

To save manpower, reduce accidents caused by timbers weakened through decay or fire, insist on "CZC"-treated wood for all construction. There is ample preservative and treating capacity to meet both military and essential mining requirements.

DU PONT
REG. U.S. PAT. OFF.

CZC

CHROMATED ZINC CHLORIDE

WOOD PRESERVATIVE

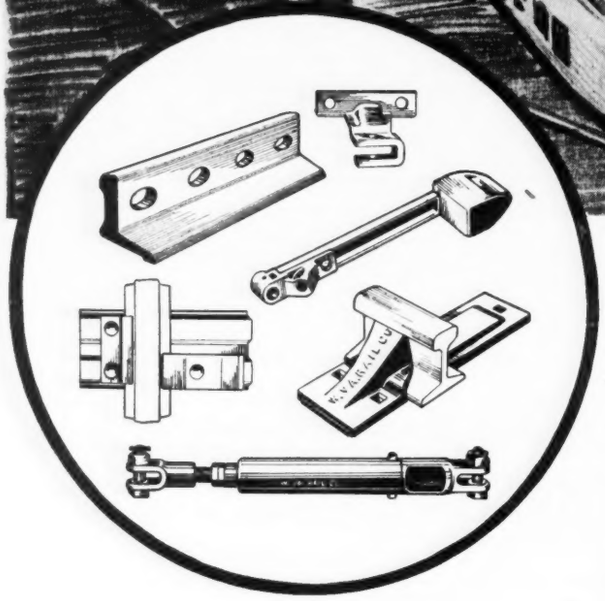
Write today for your free copy of "Wood Preservation for Mines." E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington, Delaware.

BETTER THINGS for BETTER LIVING . . . THROUGH CHEMISTRY

Lest we forget—

MINES HAUL MORE COAL

THAN ALL U. S. CLASS A RAILROADS COMBINED*



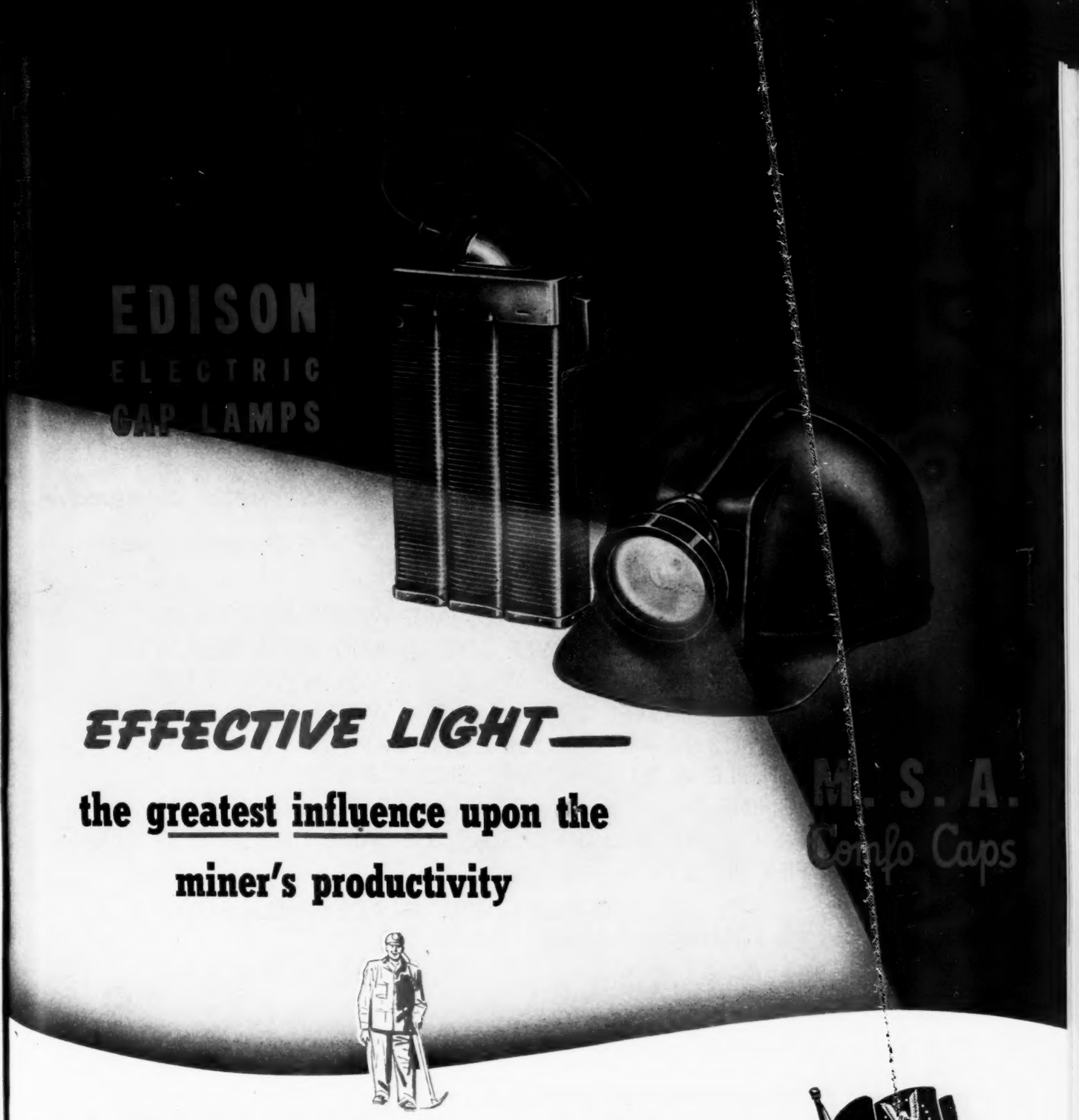
To keep 'em rolling, we can assure PROMPT DELIVERY on a number of standard track equipment replacement parts.

• So, if we are to hit that 600,000,000-ton goal—and keep hitting it—keep a sharp eye on your haulage roads. To avoid production delays we urge you to inspect your haulage roads regularly, note these small items that may fail, and order them accordingly so there will be no halt to vital coal output. We can assure the delivery of these small parts now, that you will need in the future . . . so, NOW IS THE TIME TO ACT . . . TO PREPARE FOR THE FUTURE . . . TO CONSERVE YOUR TRACK EQUIPMENT BY PROPER MAINTENANCE. Write us, listing items you need . . . or call in a West Virginia Rail engineer and go over your track equipment with him—he'll point out the weak spots and make repair recommendations.

* Mines haul the coal consumed at the mines plus coal shipped by river barges, etc.

THE WEST VIRGINIA RAIL COMPANY

HUNTINGTON (1) WEST VIRGINIA

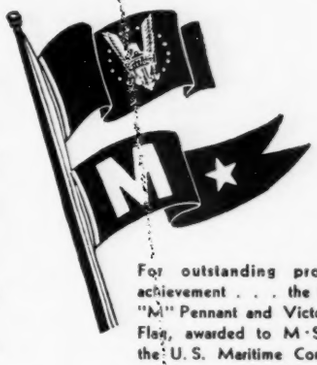


EFFECTIVE LIGHT—

the greatest influence upon the miner's productivity

Completely dependent upon artificial illumination—every working hour and minute underground—the miner translates in unmistakable terms of *production* the higher quality, safety and dependability of his Edison Electric Cap Lamp.

Powered by the unique Edison *alkaline* battery, this famous lamp unfailingly produces the maximum of effective light over many years of useful life . . . joining with the head protection of its partner, the M·S·A Comfo Cap, in aiding delivery of the tremendous mining production demanded for Victory.



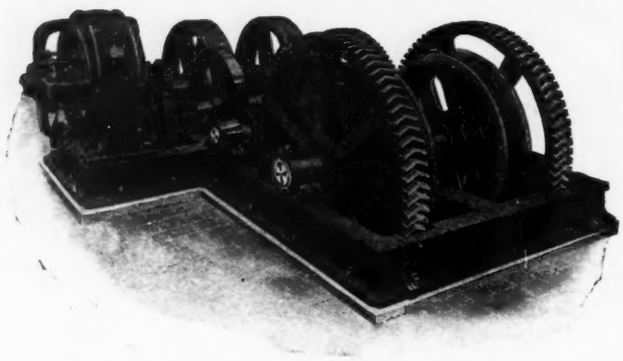
For outstanding product achievement . . . the Marit "M" Pennant and Victory F Flag, awarded to M·S·A the U. S. Maritime Commiss

MINE SAFETY APPLIANCES COMPANY

Braddock, Thomas, and Meade Streets

PITTSBURGH, PA.

MOVE COAL CARS



Electric Driven Endless Rope Haulage Machine

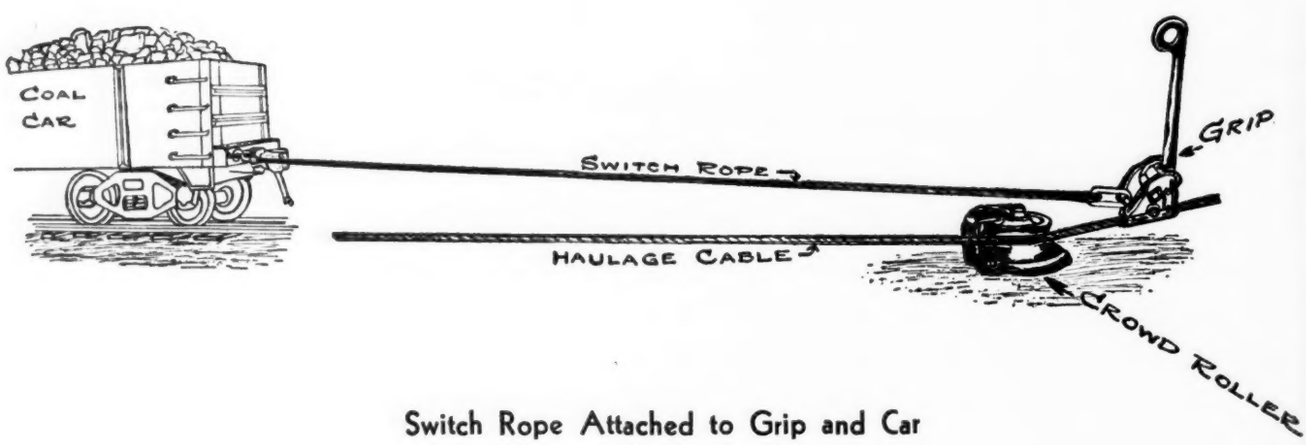
***When* you want them**

***Where* you want them**

Without depending on locomotives

TODAY, LOCOMOTIVES ARE WORKING HARDER AND LONGER THAN EVER BEFORE AND AS A RESULT THEY ARE OFTEN NOT AVAILABLE WHEN YOU NEED THEM TO MOVE COAL CARS. WAITING TIME—IS COSTLY TIME—MOVE YOUR COAL CARS TO AND FROM THE TIPPLE WITH A HOLMES ENDLESS ROPE HAULAGE MACHINE. THEY CAN BE INSTALLED TO MOVE COAL CARS ON SEVERAL TRACKS AT THE SAME TIME AND IN EITHER DIRECTION.

HOLMES ENGINEERS WILL GLADLY HELP SOLVE YOUR MINING PROBLEMS.

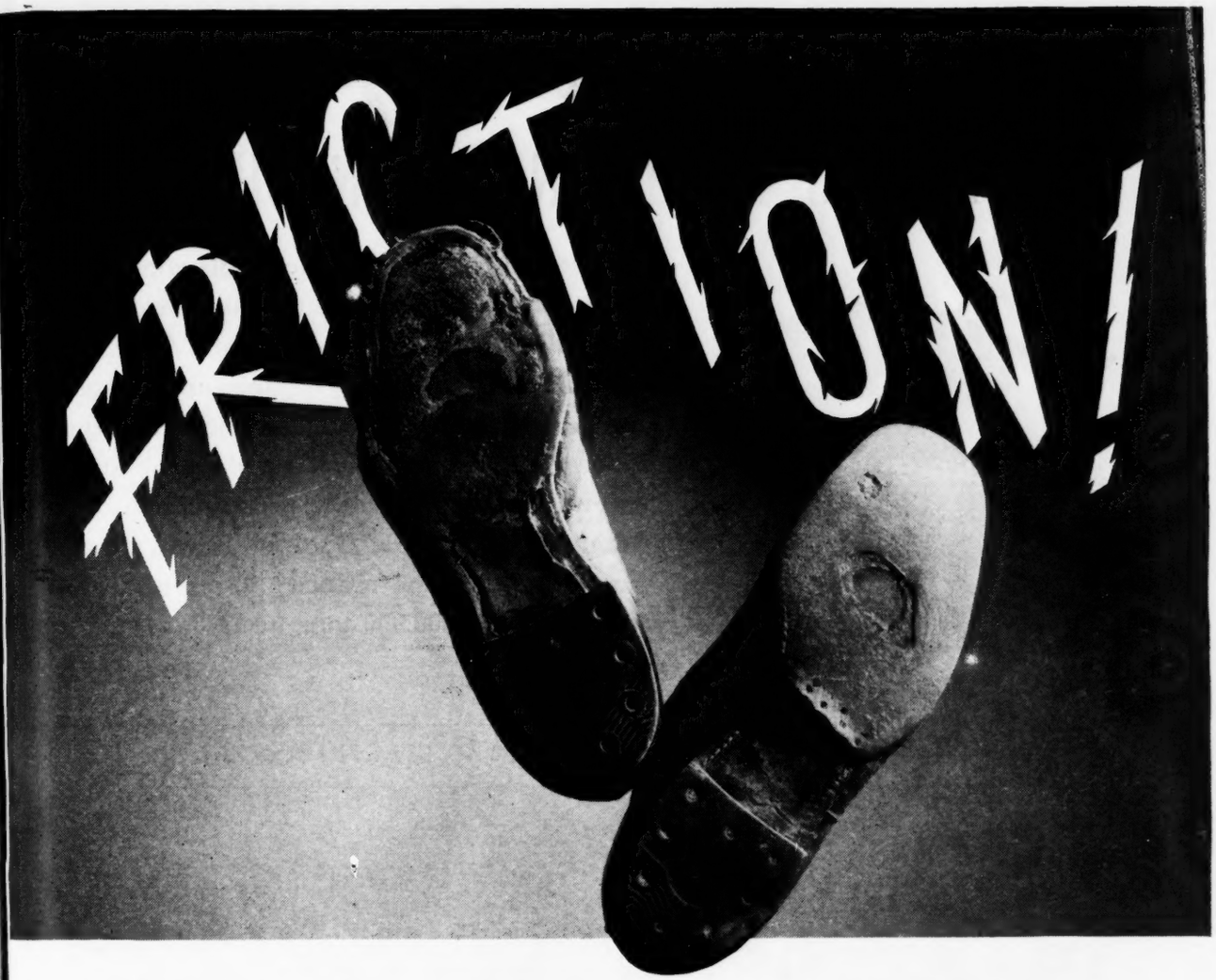


Switch Rope Attached to Grip and Car

ROBT. HOLMES AND BROS., INC.

Bins - Gates - Lowering Spirals - Dust-O-Lators - Shaking Gates

DANVILLE, ILLINOIS



REDUCE WEAR AND REMOVE CARBON WITH MACMILLAN RING-FREE MOTOR OIL

Undue motor wear, waste of fuel and excessive carbon have no place in a sound preventive maintenance program. At the same time, "production" must be speeded up. That's why operators simply must pay more than usual attention to motor lubrication ...and motor *cleanliness.*

Macmillan RING-FREE Motor Oil cuts down waste and wear while speeding up performance, and at the same time, RING-FREE removes carbon!

In 1094 Certified Road Tests, with various makes of owner-driven cars, 10 per cent increases in gasoline mileage were not uncommon after crankcases were drained and refilled with RING-FREE. As indicated by these tests, the average immediate saving was 1.3 miles per gallon! These tests emphasize that RING-FREE lubricates better . . . *reduces friction faster.* It delivers direct to the drive shaft more of the horsepower ordinarily wasted in overcoming motor friction. It postpones "down-time" for repairs.

Macmillan RING-FREE Motor Oil combines all these qualities: great film strength, high heat resistance, long cling to metal, fast penetration . . . *plus* the fact that it is non-corrosive, is less affected by dilution and it *removes carbon.*

CARBON REMOVAL A NATURAL RING-FREE FUNCTION

Macmillan RING-FREE Motor Oil actually removes carbon while the motor runs! Hence, by its continued use, pistons, rings, valves—all vital parts—stay cleaner. Carbon removal is a natural function of RING-FREE, inherent in the crude oil and retained by the exclusive Macmillan patented refining process, *without the use of additives.*

TO SUM UP: MACMILLAN RING-FREE gives more horsepower to the drive shaft—tangible saving of fuel—allows less wear on hard-to-replace engine parts—it removes carbon.

Macmillan Petroleum Corporation

50 W. 50th St., New York • 624 S. Michigan Ave., Chicago • 530 W. Sixth St., Los Angeles

MACMILLAN RING-FREE MOTOR OIL

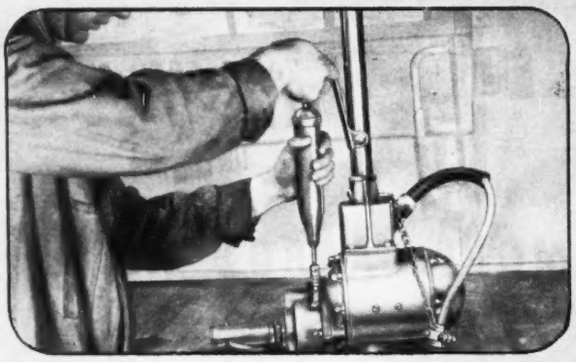
REDUCES WEAR BY REDUCING FRICTION

Four Simple Check-Ups

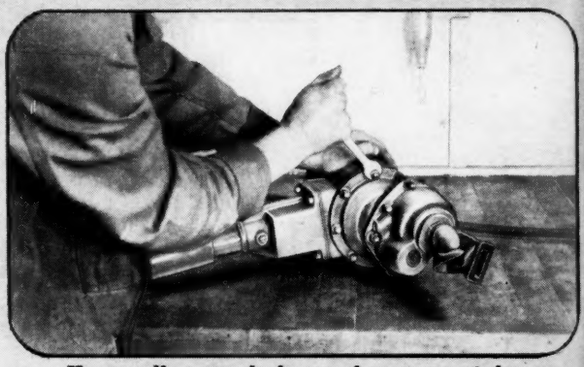
WILL KEEP DRILLS IN CONTINUOUS SERVICE

DESIGNED by men familiar with coal mining conditions . . . built to take the hard knocks that fall to all mining equipment, CP Electric Coal Drills require only a minimum of maintenance attention. With lubrication at regular intervals, a periodic check-up of bolts, nuts and screws and a few simple precautions against damage, CP Electric Coal Drills will do their part in helping the industry to mine those all important 660,000,000 tons in 1943.

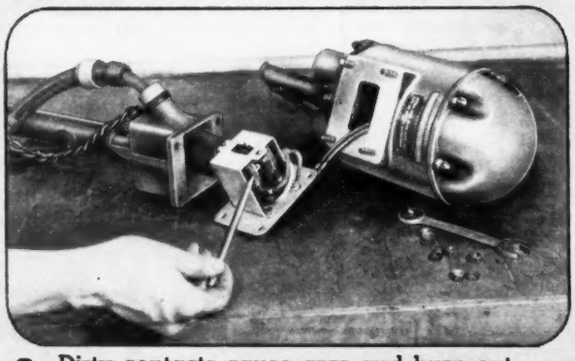
HOW TO GET MAXIMUM SERVICE FROM CP ELECTRIC COAL DRILLS



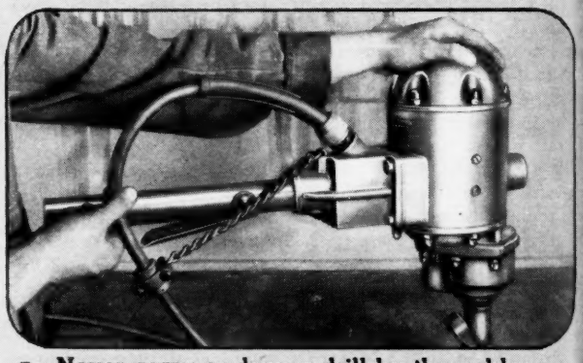
1 Every three months, clean out gear case and renew grease—no more than 2/3 full.



2 Keep all nuts, bolts and screws tight. Check at least once every three months.



3 Dirty contacts cause arcs and burn out switches. Be sure contacts are clean.



4 Never carry or drag a drill by the cable. Keep cable strain relief in the arc shown.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

Open Hillside Crops Faster

with BAKER HYDRAULIC GRADEBUILDERS

A number of eastern Ohio, western Indiana, central Illinois and Pennsylvania operators tell us that the one practical way to make fast hillside cuts is with Baker Gradebuilders. Mounted on tractors that can negotiate steep grades inaccessible to shovel or dragline, they gain access to rich veins and quickly remove the cover. They build roads and ramps so rippers, drills, shovels and trucks can get in to remove the coal.

Many outcrops thought too hard to work have been profitably opened with these fast, rugged, readily maneuvered earth movers. Once overburden is stripped, they scale off bone, help shovel loading and are useful in many other ways.

The Baker hydraulic system operates in any weather, is easy to maintain and provides direct lift and full down pressure on the blade. The entire weight of the tractor front end can be exerted on the blade. Moldboard can be angled either to left or right. Coal men like its quick convertibility from gradebuilder to bulldozer — moldboards are interchangeable on same frame.

Ask the mines using Bakers and you'll want them in your pit — available now on high priority. Send for Booklet "The Unsung Heroes of War."

THE BAKER MFG. CO.
514 Stanford Ave.
Springfield, Ill.

BAKER *The Modern Tractor Equipment Line for*
EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE

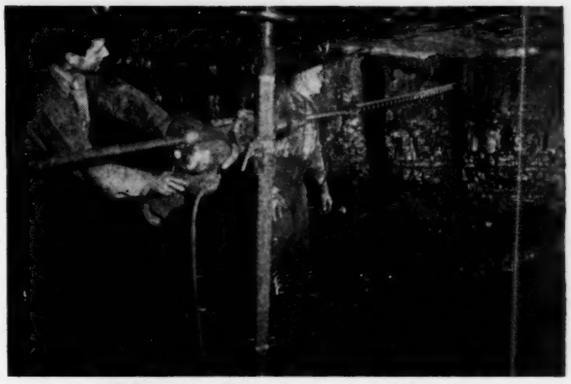
TESTED METHODS for those Important Drilling Operations

★ This organization has lived with the mining industry for sixty-three years. During this time new designs have been continually produced as mining technique has advanced and in each, the importance of speed in results and economy in production has received full consideration.

An example of Hardsocg cooperation with the industry is in this organization's introduction of rotary drilling which is the basis of all present day coal drilling practice.

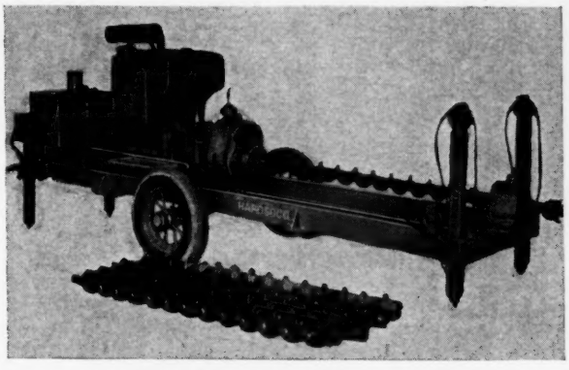
Each piece of Hardsocg equipment offers a tested method —proved in the service of the largest producers whose engineering departments make careful investigation of equipment before acceptance.

HARDSOCG manufactures Vertical and Horizontal Electric and Gasoline Driven Drilling Machines for Coal Stripping operations, Conveyor type augers and cutter heads, drill bits, electric coal drill feed bars and boxings, Ball Bearing Differentials, Caterpillar Jack Shafts and Heat Treated Alloy Steel Gathering Arm Points for Loading Machines, Coal Miners' Tools and Supplies.



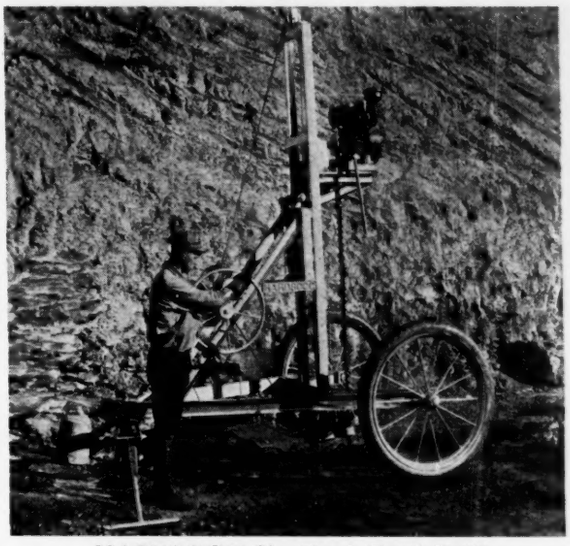
HARDSOCG Conveyor Augers

Conveyor Augers furnished in any size from 1¾" up with cutter heads to correspond. The connections are splined similar to the drive shaft of your car, withstanding excessive wear and offering least resistance to the flow of cuttings over the joints. Automatically and securely latched together and easily disconnected.



HARDSOCG Conveyor Augers

Allows the distribution of the powder in the hole so that it parallels the particular strata which is to be shattered. You get better breakage in shale formations when blasting and it is easier and faster drilling than that of vertical. Can be moved from shot hole to shot hole by hand during active drilling operations. Holes up to 6 inches can be drilled using Hardsocg Conveyor Augers, Cutter Heads, and Alloyed Steel Bits. Variable depth of hole controlled by the number of extensions used.



HARDSOCG Vertical Coal Drill

More holes in shorter time are possible with the Hardsocg Vertical Coal Drill . . . smoother holes that make it easier to sink dynamite charges. In freezing weather drilling is faster as no water is required for lubricating the drill. Material comes up dry, not muddied, making it easier to take samples for analysis. Only one man needed for operation. Holes up to 3 inches in diameter can be rapidly drilled. The Hardsocg Drill is readily portable. It is mounted on a light channel iron frame with two large steel rimmed wheels in front and a small one behind.

HARDSOCG
"Humdinger"
Coal Bit

This drill bit has been serving mines for years—millions of them have been made and all the way through they have been uniform. The "HUMDINGER" is scientifically heat treated —experience designed it and experience produces it. You will find that it holds its cutting edge—that it helps you do those drilling jobs quicker and easier.

For the duration, steel rimmed wheels are used in place of rubber tires.

HARDSOCG MANUFACTURING CO.

Manufacturers of

POWER DRIVEN ROTARY DRILLING EQUIPMENT • MINERS TOOLS & SUPPLIES

Since 1879

OTTUMWA, IOWA

PUT MORE WORKING DAYS ON YOUR CALENDAR

with

Walter Tractor Trucks

WHEN other trucks are stopped or slowed by bad weather and difficult driving conditions, Walter Tractor Trucks are out hauling as usual. They pull as high as 50 ton payloads through thick ooze, soft ground and over slippery, twisting roads and grades because they have the positive traction of FOUR DRIVING WHEELS.

But four-wheel drive is only part of their story. The Walter Tractor Truck gets real super-traction from its three Automatic Lock Differentials that proportion the torque to each wheel according to its traction at the moment. This means that as long as there is a spot for just one wheel to grip, the Walter Tractor Truck keeps moving.

Other features of the Walter Tractor Truck are: 175 hp. Diesel Motor; Tractor Type Transmission with 6 speeds forward, 2 reverse, fast high gear, powerful low gear; Suspended Double Reduction Drive that increases gear capacity, gives higher ground clearance and reduces unsprung weight; Short wheelbase and scientifically distributed weight for safety and maneuverability.

Write today for detailed literature.

WALTER MOTOR TRUCK CO. • 1001-19 IRVING AVE., RIDGEWOOD, QUEENS, L. I., N. Y.

Hire a NOLANeer to do your car-dumping job!

Nolan Rotary Car Dumpers are built in suitable lengths for multiple car dumping, with a number of automatic and semi-automatic drive and control features.

The NOLANeer is the spirit of Nolan engineering skill and mechanical power. He symbolizes all the efficiency and performance which is built into Nolan Mine Car Dumping and Control Devices, to aid production in your mines.

You'll find NOLANeers in hundreds of mines throughout America. They are the guiding forces in the swift dumping of coal and control of mine cars with Nolan units, saving precious time, labor and money.

Nolan Single and Multiple Rotary Car Dumpers will easily dump four to six cars a minute, coupled or uncoupled. Sturdy construction is a feature of the Nolan Car Dumper. Rings and trunnions are made of alloyed cast steel carefully machined; the cage structure is of heavy structural sections and plates. Heavy rigid base frames maintain wheel bearings in permanent alignment and carry baffle sheet supports, making entire unit compact and quickly installed.

Nolan Rotary Car Dumpers turn a full revolution at each operation. Starting is by a convenient hand lever operating mechanical rail aligning stop and motor contactor. The dump completes its cycle automatically. The dumping principle allows the handling of material with rigid, solid body mine cars, resulting in cheaper first cost, reduced maintenance, and far less coal degradation.

Write for complete information on Nolan Rotary or Gravity Car Dumpers, Trip Feeders, Car Hauls, Automatic Cagers, Platform and Self-Dumping Cages, Cushioned Car Stops, and Mine Car Retarders.

NOLAN

THE MINING SAFETY DEVICE CO.

★ BOWERSTON, OHIO ★

McLANAHAN COAL CRUSHERS

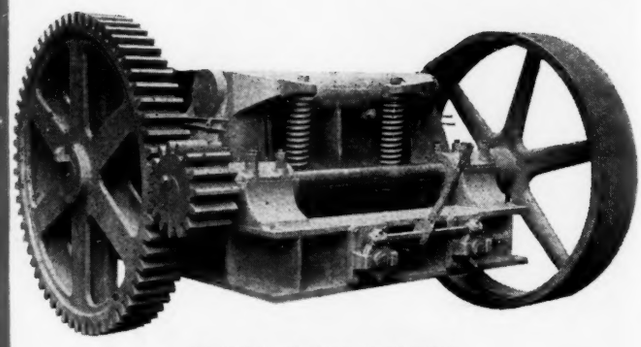
AID TODAY'S PEAK PRODUCTION!

The ever-increasing demand for stoker and other prepared coal sizes requires top performance by *your* crushers—they must be able to "take it."

McLanahan Crushers have the "built-in" stamina that handles *any* tonnage for *any* product and these proved units are constructed of steel, semi-steel or fabricated steel, with babbitt, bronze or roller bearings.

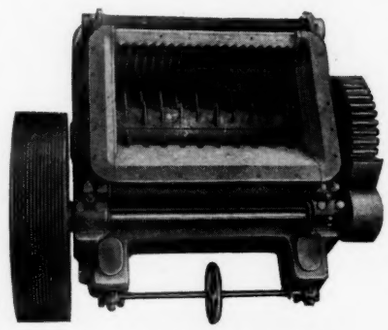
Patented solid or segment rolls . . . with or without automatic tramp iron protection . . . easily and quickly adjustable . . . of highest mechanical efficiency.

Have you the McLanahan data?



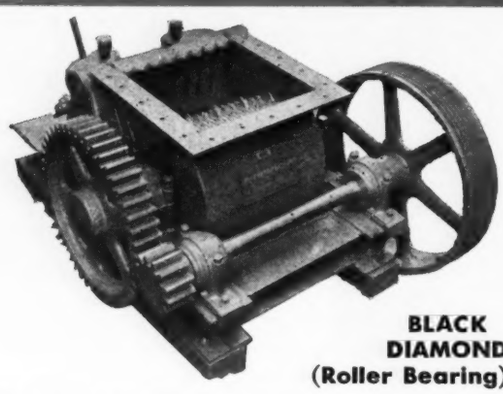
GIANT ROCK MASTER

An all-steel, automatic steel strut crusher, in any size or capacity for handling rock and mine refuse.



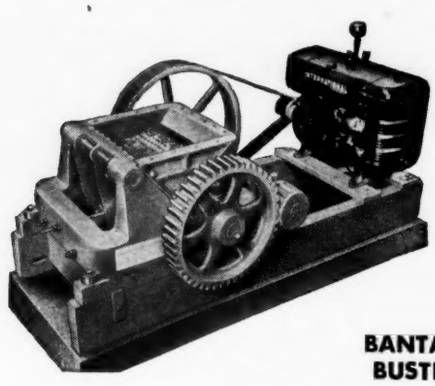
BLACK DIAMOND STEEL STRUT

A steel strut primary or secondary crusher . . . for cracking large or small lumps with a minimum of fines. Extensively used throughout anthracite and bituminous fields.



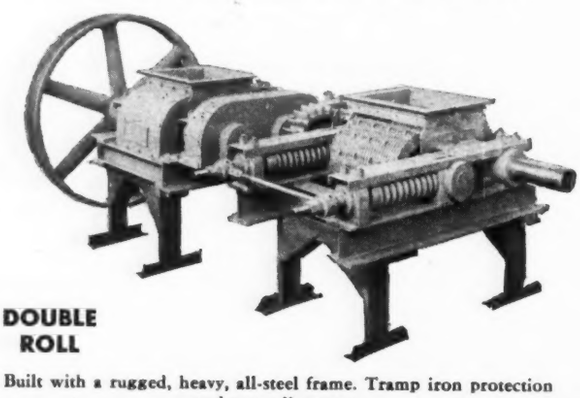
BLACK DIAMOND (Roller Bearing)

An all-steel, roller bearing unit, quick adjustment control and automatic steel and scrap iron protection. For limited headroom.



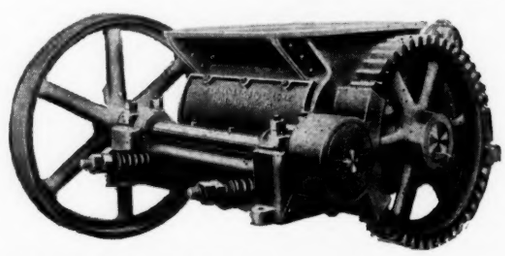
BANTAM BUSTER

The new Bantam Buster—a low price unit designed for truck mines and low capacity operations. With or without engine.



DOUBLE ROLL

Built with a rugged, heavy, all-steel frame. Tramp iron protection and easy adjustment.



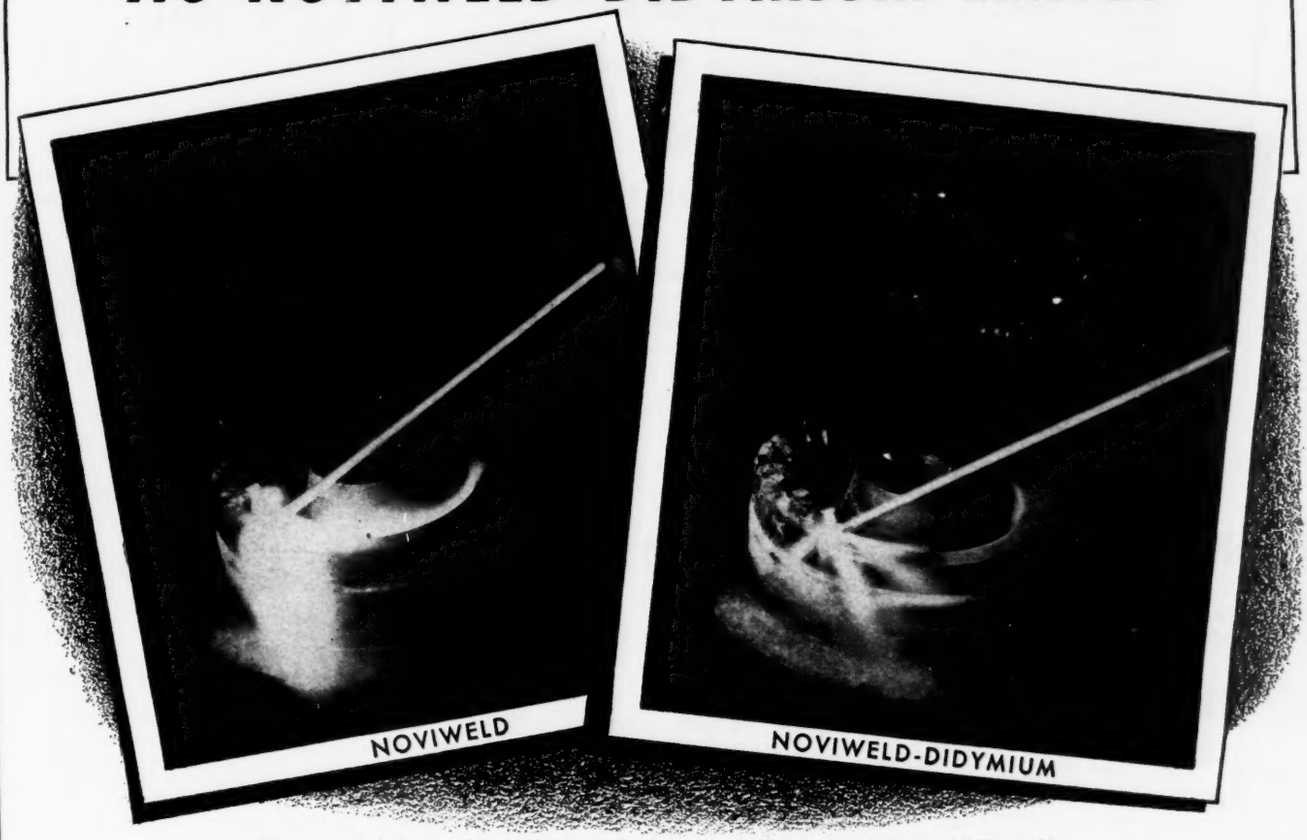
BLACK DIAMOND (Conventional Type)

Low cost, conventional type of Black Diamond Single Bolt Adjustment Crusher built in one-piece frame. Spring Rod adjustment. Protection against tramp iron provided by shear pins in the pulley.

McLANAHAN AND STONE CORPORATION · HOLLIDAYSBURG, PA.

Originators of Single Roll Crushers

These unretouched Pictures show you why welders do better work with AO NOVIWELD-DIDYMIUM LENSES



The unretouched photograph, at right, instantly shows that welding goggles equipped with Noviweld-Didymium Lenses enables a flame-welder to look right through the cloudy yellow flame of burning sodium vapors and see the rod and molten area more clearly. This clearer vision greatly increases his efficiency. allows him to do more and better work, gives him greater protection and comfort.

... and NOVIWELD-DIDYMIUM LENSES offer you all these other advantages, too...

Noviweld-Didymium Lenses are considered by many who have tested them, to be the greatest welding glass *ever* developed! *That's* how important they are to your company . . . and to war production.

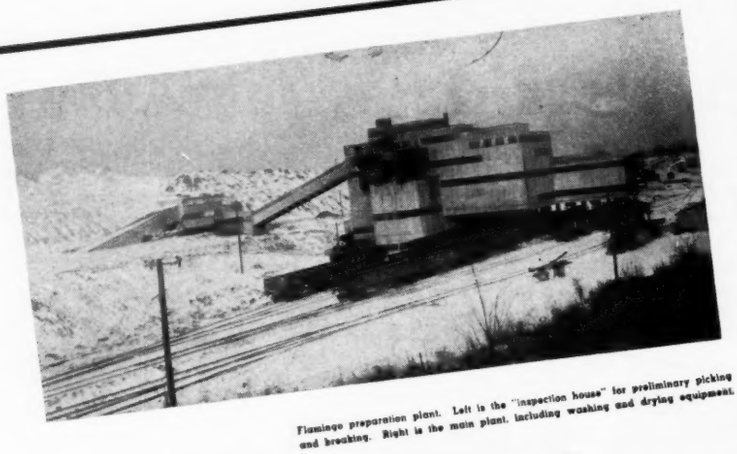
REMEMBER: AO Noviweld-Didymium absorbs Sodium flare and *also* protects welders' eyes against BOTH ultra-violet and infra-red radiation, meeting the Bureau of Standards Safety Code Specifications in both of the latter respects.

And, in addition, Noviweld-Didymium has the following *other* advantages: it preserves orange and red color values, enabling the operator to see red-hot bead and molten area in brilliant color, it is ground and polished to ophthalmic standards of quality, *and* present stocks indicate *immediate delivery* in shade numbers 4, 5 and 6 for welding goggles.

Behind Noviweld-Didymium are American Optical Scientists and the achievements of the AO Laboratory . . . the same laboratory that has contributed so many other outstanding developments to welding eye protection and *better* welding.

Don't wait . . . get in touch with your nearest AO Branch Office today for a convincing demonstration of how Noviweld-Didymium allows both skilled and inexperienced flame-welders to do better work.

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS



Flamingo preparation plant. Left is the "inspection house" for preliminary picking and breaking. Right is the main plant, including washing and drying equipment.

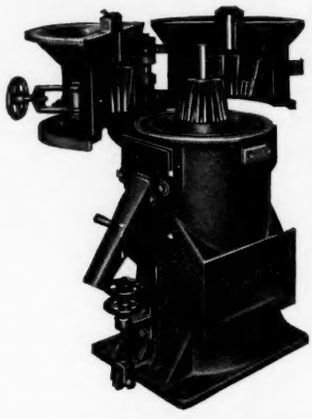
WASHING AND DRYING
Feature New Flamingo Preparation Plant

Primary and Rewash Units Clean All Coal Under 6-In.—Sizes Under 1¼-In. Heat-Dried. Complete Crushing, Screening and Storing Facilities Provided. Coal Quality Assured Through Laboratory Controls.

...mp. plant, along with ...

"COAL QUALITY ASSURED THROUGH LABORATORY CONTROL"

COAL AGE—MARCH



The Laboratory in the new Flamingo Preparation Plant uses

THE IMPROVED

Sturtevant

AUTOMATIC COAL CRUSHER AND SAMPLER

Control of *Quality* is one of the outstanding features in the operation of the 600-tons-per-hour Preparation Plant serving the new Flamingo Mine of the Fairview Collieries Corporation, Fairview, Illinois. The Sturtevant Crusher in the Flamingo Laboratory automatically and rapidly gives samples that are truly representative of all material passed through—eliminating 32 of the 34 tedious splitting operations ordinarily required by hand sampling. The result is that Flamingo wants—namely—a *uniform quality* coal insured by perfect laboratory controls.

• BOOST COAL SALES HELP WAR PRODUCTION

The Colliery that gets away from selling just *coal*—and sells guaranteed B.T.U.'s (i. e., better boiler performance, lower maintenance and savings on fuel bills) is the Colliery that will *sell more coal*. At the same time, this means helping the War effort, by increasing plant efficiency. The *Sturtevant* Crusher and Sampler is essential equipment in such a program. Its value and efficiency have been proved. That's why big modern properties like Flamingo use it in their control laboratories.

Sturtevant Whirlwind . . Centrifugal Air Separator

The Sturtevant Air Separator is an advanced type of centrifugal classifier for extremely fine and uniform separation of materials, ranging from 50-mesh to 350-mesh. Used in closed circuit with a pulverizer, this machine will produce a finished material to a closely controlled particle size.

Particularly adapted to the dry cleaning of fines.

Write today for Bulletin completely describing this Unit. See how you can fit it into your plant—we will be glad to advise you if you will send us data to go on . . . all inquiries held strictly confidential and replies create no obligation. Write or wire today.

Sturtevant Mill Co.
Dorchester • Boston, Mass.

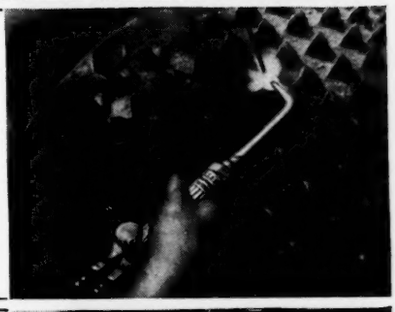
How to keep them in service—LONGER!

Rebuild worn or damaged machinery parts by these proved Airco processes

Cast Iron Welding, using Airco No. 9 Cast Iron Rod, is the reliable method of repairing damaged castings. Airco No. 9 is a quality cast iron rod which flows freely and produces sound, machinable welds.

Bronze Welding. Airco No. 20 Bronze Rod is used for general brazing especially recommended for cast iron. Airco No. 20 Rod is free flowing, produces a high strength bond. Has excellent tinning qualities.

Hard Facing worn cutter bits, and other tools subject to heavy abrasion gives unusual wear-resistance to these parts. Using Stoody Hard Facing alloys—Stoodite, Stoodite K, and Stoody Self-Hardening K—worn cutting and drilling equipment is rebuilt quickly and economically.



Flame Hardening imparts a wear-resisting surface, without affecting the core properties of steel. With standard Airco equipment all common steels of 0.35% carbon content or greater may be flame hardened to controlled depths and hardnesses with minimum distortion.

PLUS AIRCO SERVICE: Air Reduction's Field Engineering Staff will be glad to assist you in the application of these time- and material-saving methods. Write nearest Air Reduction office for details.

Air Reduction

General Offices: **60 EAST 42nd ST., NEW YORK, N. Y.**

IN TEXAS: MAGNOLIA-AIRCO GAS PRODUCTS CO.

General Offices: **HOUSTON, TEXAS**

AIRCO

WILSON

IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!*

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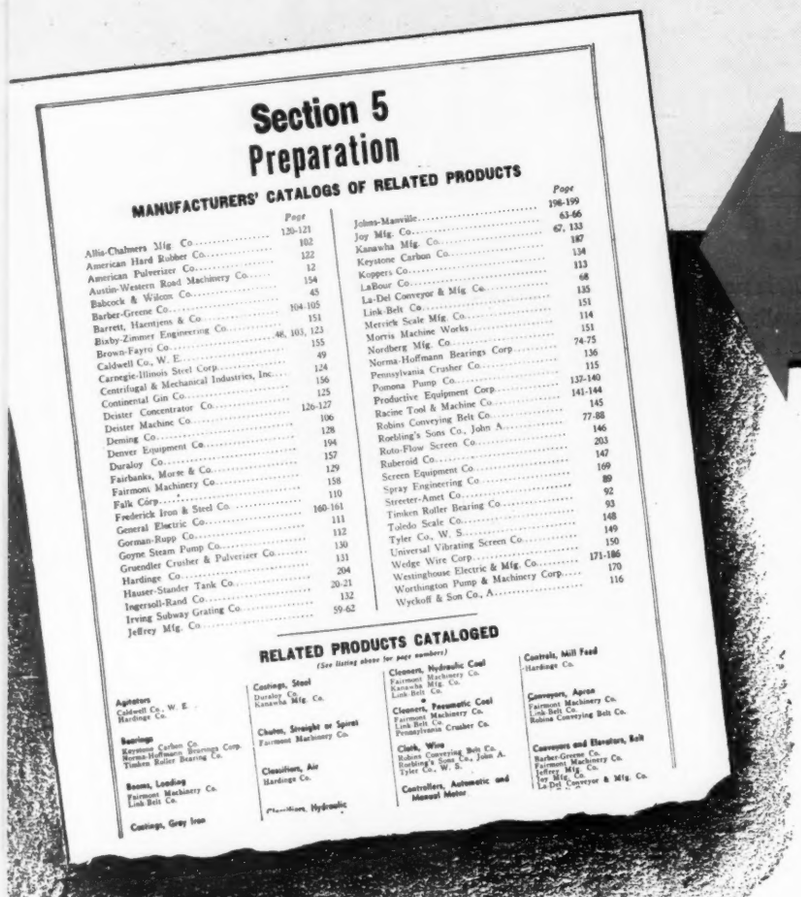
MANUFACTURERS' CATALOGS OF EQUIPMENT AND SUPPLIES



TURN TO PAGE 118 OF YOUR COAL MINING CATALOGS FOR THIS INDEX
—one of seven sections in this handy, useful catalog.

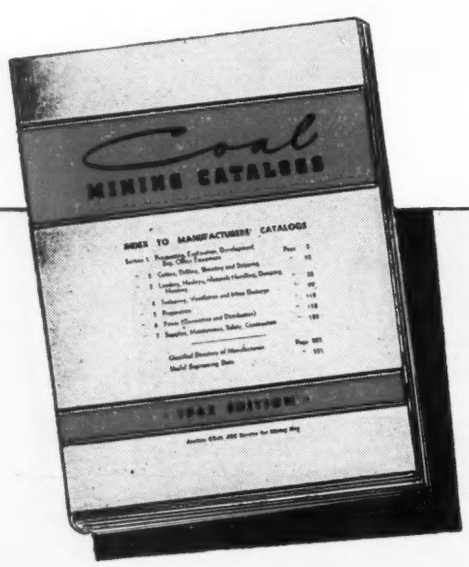
These COAL MINING CATALOGS features speed your specifying, requisitioning, and buying . . .

- **DETAILED CATALOG DATA of 131 manufacturers at your finger tips in handy compact sectionalized form!**
- **129 TABLES OF FUNDAMENTAL engineering and operating data that you'll daily find useful in dozens of ways!**
- **CLASSIFIED DIRECTORY of Manufacturers listing all principal manufacturers of coal mining machinery, equipment and supplies, indispensably classified by product for quick reference!**

Today, where every minute saved means increased coal tonnage for essential war effort, you'll find COAL MINING CATALOGS more helpful and useful than ever before in your specifying, requisitioning and buying. In improved sectionalized form, with the latest catalog data from manufacturers, this 1942 edition is one catalog you'll keep right at your elbow for daily, speedy reference.

Send For Your Copy TODAY

If you are responsible for the specifying, requisitioning or buying at your mechanized property and you don't have available your free copy of the 1942 EDITION, *request it immediately.* Write us on your letterhead, telling us about your property, or use the coupon. We'll see that you receive your copy by return mail.



COAL MINING CATALOGS, 330 West 42nd St., New York, N. Y. C.A., May,

Gentlemen: I am responsible for specifying, requisitioning, or buying equipment supplies needed at our property, and do not have access to COAL MINING CATALO Please forward me a copy of the 1942 Edition immediately. (If my country impos duty on such Catalog books, I agree to pay same.)

Name ..... *Title* .....

Company Name .....

Address .....

The nature of our operation is .....

More tons of coal per shift, at lower cost per ton is always good business, but today it's more than that: It's the way every mine can best do its share to produce the 665,000,000 tons America *must* have this year.

To help do that job Du Pont offers "Lump Coal" C—the dynamite that today is the most used of all permissible explosives in U. S. coal mines.

The action of "Lump Coal" C is the nearest approach to that of black powder yet achieved in a permissible. It's a slow, heaving action that rolls the coal forward, away from the face, into position where mechanical loaders can get it easily.

When properly loaded, "Lump Coal" C shears ribs clean, practically eliminating tight or hanging shots—and its remarkable spreading action frequently means you can bring down a face with fewer drill holes—saving time and explosives. In addition, an excellent grade of lump is obtainable when wanted.

This outstanding permissible is geared to today's demand for the fast, easy loading that gives greater tonnage and lower costs. For further information, write or call: E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington, Delaware.

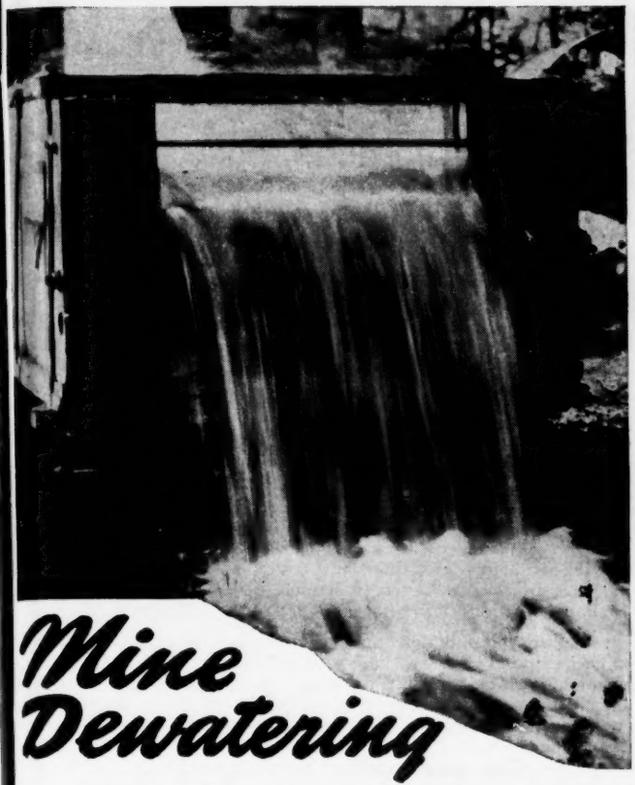
TIPS FOR BETTER BLASTING

Sometimes it's the obvious things that are neglected. Take bug dusting for example. We all know it's necessary—that when cuttings are left in the undercut no explosive can do its job properly. Yet this is often overlooked. That's why we urge every superintendent, foreman, and preparation engineer to *see that bug dust is out before shooting.*

DU PONT
REG. U. S. PAT. OFF.

"LUMP COAL" C

SAVE FATS FOR EXPLOSIVES—*Fats are urgently needed for making glycerin—an essential ingredient in the production of high explosives. Urge housewives to aid the war effort by taking waste fats to their butcher.*



Mine Dewatering

DEMANDS TRUSTWORTHY PUMPS

How recently have you checked up on your pumping equipment? Is it adequate for the job? Is it in good operating condition? Is it ready for trustworthy service in any emergency?

The time to get the correct answers to those questions is NOW— *before emergencies develop.* Your Deming Distributor can help. But give him ample notice, for his sake *and YOURS!*

THE DEMING COMPANY • SALEM, OHIO

Send for illustrated Bulletin 1000 which features all popular types of Deming Mine Pumps.

DEMING MINE PUMPS

NEARLY 50 TONS AT A BITE!

Photo Courtesy Tecumseh Coal Corp., Boonville, Ind.

LINCOLN GREASE GUN

is used to lubricate giant electric shovel picking up to 48 tons in a single bite

The electric shovel shown above is 105 feet high. It weighs 3,200,000 lbs., yet moves with comparative ease. As you will note—a Lincoln Grease Gun shoulders the responsibility for proper lubrication.

Lincoln is equally well qualified to supply the correct lubricating equipment for your *needs.* This great line includes many types of hand, electric and air operated grease guns, automatic and manually controlled centralized systems, and a full range of all types and sizes of grease fittings ...Call your mine supply distributor, or write us for details.

ARMY-NAVY PRODUCTION AWARD for high achievement in the production of war equipment has been conferred upon the Lincoln Engineering Company. It serves as inspiration toward greater and greater accomplishment until the time of final and complete Victory.

143-15

LINCOLN ENGINEERING COMPANY
PIONEER BUILDERS OF LUBRICATING EQUIPMENT
ST. LOUIS, MO.

STILL IN SERVICE . . . AFTER 41 YEARS!

At an age when most locomotives have been retired to that limbo of obsolete power—the scrap pile—this old-timer, the "General" still wears its service stripes.

For many years after it was built-by-Lima in 1902, the "General" hauled timber from the woods adjacent to Lockhart, Alabama. Today this four-star Shay Geared Locomotive has been pressed into service at the busy shipyard of J. A. Jones Construction Company, Brunswick, Georgia. "The venerable performer has made good, too", the present operators claim.

Here's another testimonial to the longevity and versatility of Lima-built power. For pit work, lumber operation, or other unusual hauling problems, Lima Shay Geared Locomotives provide the answer.

LIMA
LOCOMOTIVE WORKS
INCORPORATED
LIMA, OHIO

A Necessity for Every Mining Machine

Three popular 5-ton sizes:
84 A, 14" high, 7" lift.
85 A, 17" high, 10" lift.
86 A, 20" high, 73" lift.
Toe lift on all sizes lifts from a minimum of 1¾".

Keep a Simplex Automatic Lowering Mine Jack on every coal cutter, loader, and locomotive—it pays. Time spent by miners looking for a jack cuts production. Shoving and tugging is time-wasting and hazardous.

Templeton, Kenly & Company
Chicago
Better, Safer Mine Jacks Since 1899

Make Your Jacks Last Longer!
Proper lubrication, care and handling will do it. Send today for a bulletin on the care of jacks.

Simplex
LEVER · SCREW · HYDRAULIC
Jacks

FOR SALE

SHORTWALL MINING MACHINES

2—312-AA Goodman, 250 volt, low vein. Like new.
2—212-AA Goodman, 250 volt, low vein. Like new.
10—Jeffrey 50 H.P., 250 volt, 7½' cutter bars.
10—Sullivan CE-7, 220 volt AC, 7½' cutter bars.

LOCOMOTIVES

29—Rebuilt 6, 8, 10, 13 and 15-ton Jeffrey, Goodman, Westinghouse and General Electric. Any track gauge for your requirements.
4—Late type 8-ton Tandem Goodman Locomotives. Rebuilt.

ROTARY CONVERTER

1—200 KW General Electric, type HCC-6, form P, 1200 RPM, 250 volt, switchgear, transformers and all appurtenances.

JOY LOADING MACHINES

3—7-BU, 250 volt.
8—5-BU, 250 volt. Excellent condition.

ELECTRIC HOISTS

1—800 H.P. Allis-Chalmers, single drum slope hoist, 7000' of 1¼" rope, 30,000# rope pull, rope speed 870 FPM, 2300 volt.
1—500 H.P. double drum, 1600' of 1¼" rope, 2300 volt, Ward-Leonard Control.
1—1300 H.P. Ottumwa Shaft Hoist, with double cylindro-conical drums, 700' of 1¾" rope, 2300 volt motor.
1—1300 H.P. Vulcan Hoist, double cylindro-conical, 900' of 1¾" rope, 2300 volt motor.
Complete specifications on request.

MINE CARS

400—3-ton, 44" gauge, end dump mine cars, 16" Timken Roller Bearing Wheels. Just taken out of service—in excellent condition.

Frank J. Wolfe

We specialize in buying complete mines that are going out of business or from receivers in bankruptcy, administrators of estates, etc.

COAL MINE EQUIPMENT SALES COMPANY

306-7 BEASLEY BUILDING L.D. Phone-34 Terre Haute, Indiana

NOT $150,000.00, NEW Price!

NOT $127,500.00, OPO REBUILT or GUARANTEED Basis!

NOR $ 82,500.00, OPA "AS IS" Basis!

But ONLY $25,000.00! ! !

6½-7½-yd. Bucyrus 320-B ELECTRIC MINING or STRIPPING SHOVEL

Request Illustrated Bulletin

IRON & STEEL PRODUCTS, INC.

38 years' experience

13484 S. Brainard Ave. Chicago, Illinois

"ANYTHING" containing IRON or STEEL"

AN OPPORTUNITY IS OFFERED

TO THE APPALACHIAN (DISTRICT NO. 8) OPERATOR INTERESTED NOW IN THE SAFE DISTRIBUTION AND ESTABLISHMENT OF HIS COAL FOR THE POST-WAR PERIOD.

Coal Sales Corporation with maximum mine and customer confidence, plus an excellent *peace-time performance record*, is looking for the exclusive output of producer who wishes his coal established *NOW* directly with industries, utilities, railroads, docks, and retail yards with large peace-time coal requirements. In past year this sales corporation obtained from *4¢ to 11¢ per ton better than average for the field* for the mines it represents on an exclusive basis. All inquiries confidential.

BO-209, COAL AGE
520 No. Michigan Ave., Chicago, Ill.

WE LOOK INTO THE EARTH

By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

DIAMOND CORE DRILLING, for any mineral. More than sixty gasoline, steam and electric drills, suitable for any job. **OUR SPECIALTY—testing bituminous coal lands.** Satisfactory cores guaranteed. Prices very reasonable.

HOFFMAN BROS. DRILLING CO.
PUNXSUTAWNEY, PA. Est. 1902 Tel. 382

POSITIONS WANTED

POSITION WANTED—Salesman to sell Industrial equipment or supplies. Can furnish satisfactory references. Not subject to draft. PW-208, Coal Age, 520 N. Michigan Ave., Chicago, Ill.

SUPERINTENDENT OR MINE FOREMAN twenty years experience as a mine official and mechanical mining, first grade mine foreman's certificate Penna. Superintendent at present will make change. PW-215, Coal Age, 330 W. 42nd St., New York, N. Y.

BUSINESS OPPORTUNITIES

WILL ADVANCE FUNDS to mining companies to increase outputs. BO-210, Coal Age, 520 N. Michigan Ave., Chicago, Ill.

WILL LEASE OR BUY coal acreage for stripping. Have both large and small equipment. BO-211, Coal Age, 520 N. Michigan Ave., Chicago, Ill.

RAIL-RIVER Coal Mines in Midwest available on lease basis. BO-213, Coal Age, 520 N. Michigan Ave., Chicago, Ill.

FOR SALE

GOODMAN and Jeffrey Cutter and Locomotive Parts, Joy Loader, Bradford Breaker Outfit. Four 12 Cubic Yard Sidedump Railroad Cars. Two Skips or Cages, Hoisting Engines, Steel Headframes with Sheaves. FS-214, Coal Age, 520 N. Michigan Ave., Chicago, Ill.

CONTRACT WORK

COAL STRIPPING desirable contract for operator with large equipment. CW-212, Coal Age, 520 N. Michigan Ave., Chicago, Ill.

FOR LEASE

3,000 Acres, best West Virginia coal land. Underlaid with Splint and Block coals well adapted for steam and domestic purposes. This property can be developed at reasonable cost to have an annual production of 400,000 tons.

Acreage is 30 miles northeast of Charleston, West Virginia in Kanawha County, on a branch line of the New York Central Railroad running into Charleston, where it connects with main line railroads; or where coal could be shipped by barge from mouth of the Elk River over river highways, since railroad service is needed for the war effort. Reports are that eight times the amount of coal can be shipped by barge as by rail.

This field will prove an opportunity for a company who has worked out their present mines and needs new territory for reuse of their equipment, or for anyone desiring good coal property who can obtain machinery.

Frame buildings on property include a 12 room club house partly furnished, a store building with sleeping rooms above and two modest dwelling houses. Well water. Moderate supply of natural gas to accommodate houses or boiler supply, ready for piping. Small tipple mine opened, with railroad siding, but not operating due to demise.

About 30,000 acres adjoining coal lands possibly available, if needed.

For information, write to

PAUL HEAVENER, *Attorney*
Acting for heirs of the Estate,
312 National Bank of Commerce Bldg.
Charleston, West Virginia

COAL PRODUCER

Coal producer with draglines, shovels, bulldozers, LeTourneau, trucks, and complete organization interested in property with minimum of 1,000,000 tons in Ohio, W. Va., or Kentucky, suitable for stripping and rail shipping, location where tipple is available desired. If prospective property is owned by any Company engaged in the coal business, would consider contract for sale of coal. Will purchase or lease.

***Write* E. D. McCURDY**
25th Floor, Cleveland Terminal Tower,
Cleveland, Ohio

Prompt Shipment From Our Warehouse

MINING MACHINES

1—12 G3 Goodman 220/3/60 AC 6' Bar.
3—12 AB Goodman 250 V. DC 6' Bar.
1—35 B. Jeffrey 250 v. 6' Bar Bowdil #11416, with cables.
112 G3A Goodman AC Universal, 50 HP 220/440 V. 3 ph. 60 cy.

LOCOMOTIVES (Battery)

5½ Ton type E Ironton Battery Loco. 42" Ga.
5 Ton Ironton Type E2, 36" Ga.
4 Ton Jeffrey 44" Ga.

(Haulage)

10 Ton Westgh. 250 V. 36" or 40" Ga.
8 Ton Westgh. 250 V. 42" Ga.

MG SETS 3 ph. 60 cy. (Syn.)

150 KW Ridgway 250 V. DC 2200 V. AC 900 RPM.
150 KW West. 550 V. DC 2200 V. AC-1200 RPM.
30 KW West. 250 v. DC—220 v. AC 1150 RPM.
22½ KW Al.Ch. 125 v. DC—2200 v. AC 900 RPM.

ROTARY CONVERTERS

1—500 KW HCB Gen'l Elec. 275 v. with switchboards and Trans. 6600 or 3300 v. 3 ph. 60 cy.

ENGINE GENERATOR SETS

100 KW 250 v. DC Westgh.—Skinner Engine

SYN. MOTORS 3 ph. 60 cy.

HP	Make	V.	Speed
75 (2)	G.E.	2200	900

HIGH TORQUE WOUND ROTOR MOTORS (Wound Rotors)

HP	Make	V.	Speed
200 (4)	G.E.	2200	600
150 (3)	G.E.	2200	600

SLIP RING & SQ. CG MOTORS (3 ph. 60 cy.)

HP	Make	Speed	Wdg.	Type
700	G.E.	393	S.R.	MT 432
300	G.E.	600	S.R.	IM
200	G.E.	250	S.R.	MT 412
150	G.E.	720	S.R.	IM
150	West.	580	S.C.	CCL
150	G.E.	600	S.R.	IM
125	Al. Ch.	435	S.R.	
100	G.E.	500	S.R.	MI-25 cy.
100	Al. Ch.	900	S.C.	

HOISTS

75 HP Lidgerwood sgl. fr. drum
50 HP Diamond 2 drums same Shaft
30 HP Clyde sgl. drum AC Motor
30 HP Double drum—Tandem.
15 HP Lidgerwood sgl. dr. AC Motor

400 TRANSFORMERS (Westgh. & GE 1 ph.)

Qu.	KVA	Pri. V.	Sec. V.
3	1	2080/2200	115/230
5	2	"	"
100	5	"	"
82	7½	"	"
71	10	"	"
1	30	"	"
3	37 Rotary	4400/185	
3	50	22000	2200
3	75	2200	110/220
1	100	2300	230/460
		3 Phase	
3	100 Uptegraff	400	220
1	150	"	230/460

D. C. MOTORS

200 HP Allis Chalmers 230 V. 600 RPM.
125 HP General Electric 230 V. 750 RPM.
100 HP General Electric 230 V. 600 RPM.
1 to 125 HP, all speeds.

MOORHEAD-REITMEYER CO., INC.

PITTSBURGH, PENNSYLVANIA

COAL CUTTING MACHINES

3—35B Jeffrey 250 V Shortwalls.
2—35B Jeffrey 500 V Shortwalls.
1—35BB Jeffrey 250 V Permissible Shortwall.
1—35BB Jeffrey 500 V Permissible Shortwall.
1—29LE Jeffrey T.O.H. Arcwall 250 V Permissible.
1—12AB Goodman 250 V Shortwall.
2—12A Goodman 500 V Shortwalls.
1—112EJ Goodman Permissible Shortwall 250 V.
1—29B Jeffrey Arcwall 250 or 500 V.
1—12G3 Goodman AC Shortwall 3/60/220/440 V.

LOCOMOTIVES

1—8 Ton G. E. with HM-839 250 V motors.
1—8 Ton West. with 906 motors 250 V.
1—6 Ton G. E. with 250 V motors.
1—6 Ton Jeffrey with MH-88 motors.
2—5 Ton G. E. with HM-825 motors and reels.

MISCELLANEOUS

1—75 KW West. Syn. M-G Set, 250 V DC, 3/60/220 V AC, 1200 RPM, complete with switchboard.
1—500 KW West. 6 phase Rotary Converter, 500 V DC.
1—100 HP Crocker-Wheeler Syn. Motor, 3/60/240 V, 1200 RPM.
1—150 HP West. Type CW Slip Ring Motor, 3/60/2200 V, 580 RPM.
1—165 HP G. E. Syn. motor, 3/60/2200 or 550 V. two bearing, 900 RPM.
1—185 HP Burke Squirrel Cage Motor, 3/60/2200 V, 1150 RPM.
1—10 x 8 Bury horizontal belt driven Air Compressor, 219 cu. ft. 100# pressure.
1—36 x 36 Single Roll Coal Crusher.
1—30 x 36 Link Belt Double Roll Coal Crusher.
1—25 HP West. Type HK, 250 V Series Wound Hoist Motor, 600 RPM.

TIPPINS MACHINERY COMPANY
3530 Forbes St. Pittsburgh, Pa.

MOTORS IN STOCK

SLIP RING

Qn.	H.P.	Make	Type	Volts	RPM
1	20	AC		440	1150
1	30/15	G.E.	OMT	440	1150/550
3	35/15	G.E.	OMT	440	1150/550
3	50	G.E.	OMT	440	1150
1	50	Ideal	AV	2200	575

SQUIRREL CAGE INDUCTION MOTORS

1	10	West.	CS	220	1740
1	10	A-C	AN	440	1150
2	15	West.	CS	220	1155
1	20	A-C		220	860
2	25	A-C	AN	440	1150
1	40	A-C		2200	1160
2	50	West.	CS	220	900
1	50	A-C	AN	440	860

DIRECT CURRENT MOTORS

1	3	West.	SK	230	1750
7	3	West.	SK	230	1150
1	5	West.	SK	115	1150
1	5	F-M	CP-7	230	1150
1	5	G.E.	CVC	500	1350
1	20	J&L	DI-20	230	1150/550
2	25	A-C	E-20	230	850
1	30	West.	SK	230	1150

R. H. BENNEY EQUIPMENT CO.
NORWOOD, OHIO

MINE EQUIPMENT FOR SALE

Locomotives—Mining Machines—Pumps—Motors—Transformers — Steel Tipples — Rescreeners — Steam Hoists — Electric Hoists — Compressors — Loading Booms—Engines—Generators—Scales—Miscellaneous Mine Equipment

Complete Mines dismantled and sold.

HAIR EQUIPMENT COMPANY
Office and Warehouse
Reed and Election Streets
BENTON, ILLINOIS

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RELAYING RAILS—Super-quality machine-reconditioned—not ordinary Relayers.
NEW RAILS, Angle and Splice Bars, Bolts, Nuts, Spikes, Frogs, Switches, Tie Plates, and all other Track Accessories.

Phone, Write or Wire

L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

RELAYING RAIL

Practically all weights — Any quantity Immediate shipment, strictly first quality reconditioned Relaying Rail and Accessories.

Write, wire, or phone

MIDWEST STEEL CORPORATION
Charleston, W. Va.

MINE HOISTS

1—Diamond 12" Drum 20 HP electrical equipment.

1—Ottumwa 18" Band Friction 35 HP electrical equipment.

1—Vulcan 30" Band Friction with 50 HP electrical equipment.

1—Lidgerwood Haulage Hoist 6000' 1" rope 300 HP motor.

1—Lidgerwood Cylindo-Conical Drum 200-1¼ with 350 HP electrical equipment.

1—Vulcan Cylindo-Conical Drum Shaft Hoist 400 HP motor.

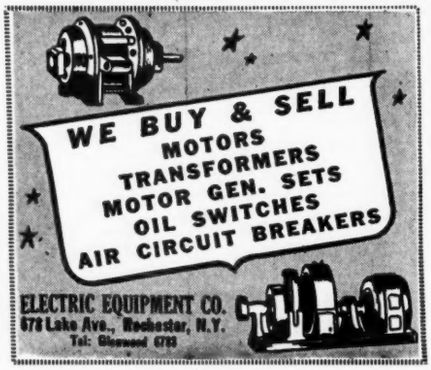
And other hoists to suit all mining conditions

Jones Mining Equipment Co.
541 Wood Street Pittsburgh, Pa.

RAILS—CARS

All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

M. K. FRANK
480 Lexington Ave. New York City
450 Fourth Ave. Pittsburgh, Pa.



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36' x 22' McCabe Screw Cutting Engine Lathe, can be motorized, standard change gears. Triple Geared type Headstock. Also, other lathes, shapers and milling machines. Write or wire your inquiries to

Cincinnati Machinery & Supply Company
217 E. Second St. Cincinnati, O.

Complete Plant—For Sale

1—500 HP, 200#, ASME, W. T. Boiler Feed Water Heater; Boiler Feed Pump; Link Belt Bucket Coal & Ash Conveyor; 150 ft. Header Line; Valves; Fittings. All Complete. Attractively Priced

H. & P. MACHY. CO.
5819 Enright St. St. Louis.

HOIST

1—Ottumwa double drum, single gear reduction Electric Shaft Hoist, complete, in first-class condition, with 60 horsepower, 600 revolution, 220 volt, 3 phase, 60 cycle, General Electric motor.

LESLIE E. BRYANT
Clarksville, Arkansas

SEARCHLIGHT SECTION

LOCOMOTIVES

Goodman: All 250 volts.
1—10 ton, 31-1-4-T.
1—6 ton, 30B, 48" 1—5 ton.
1—5 ton, W-1-2, 36".

Westinghouse: All 250 volt.
1—4 ton, 902, 48" 1—18 ton, 102, 42"
1—904 c. 44" 500 volt. Also 906 motors.
1—10 ton, 915.

G.E.: All 250 volt. 5 ton 825, 44"
6 ton 803, 44", as is 4 ton 1022, 41. as is
6 ton 823, 44" 8 ton 839 motors
6 ton 801

Jeffrey: 6 ton, and 4 ton, all gauges, 250 volt
2—**Jeffrey** MH 110 Locomotives

MINING MACHINES

Jeffrey, 35B, 29B, and 4—28A, 250 V. 2—29C with drop bar support.
Goodman, 12A, 12AB, 12AA, 12G3A, 34B.
1—12G3 250 volt and 2—112 DA, 500 volt.
2—Permissible Type 12CA. 6—112AA.
Sullivan, CE7, CE9, CE10, CR10 Low Vein.

SUBSTATIONS—275 volts, D. C.

2—200 KW **GE Rotaries** (600 volt)
1—200 KW **Ridgeway** M.G. Set.
1—200 KW **G.E.** Rotary Converter.
1—200 KW **West.** Rotary.
1—150 KW **West.** Rotary.
1—200 KW, 1—100 K **Ridgeway** M-G Sets.
1—150 KW **Ridgeway** Rotary
1—150 KW **West.** Rotary converter.
1—100 KW **West.** M-G Sets.

SPARE ARMATURES

Jeffrey MH 110, MH 78, MH 73, MH 88, 29B, 35B and 28A. **Goodman** 34B, 30B, 30C, 12A, 12AB, 12AA, 33-1-4-T, 31-1-4-T. **G. E.** 801, 803, 819, 821, 825, 839. **Westinghouse** 904, 906, 102, 907, YR2, 115. Also 200 KW **Westinghouse Rotary Converter Armature,** 250 V. Bracket Type, 150 KW G. E. HCC Bracket Type, and 150 KW G. E. TC Pedestal Type.

AERIAL TRAMWAYS * HOISTS * PUMPS * MOTORS * TRANSFORMERS * BOND WELDERS * RESISTANCE * COMPRESSORS * DUMPS * SPEED REDUCERS FIELD FRAMES * ARMATURES * GOODMAN HYDRAULIC SHOVELS * MOTOR STARTERS AND CONTROLLERS—AC & DC * DROP BAR SUPPORTS (Gooseneck), 29B and 29C * MINING MACHINE TRUCKS * SWITCHBOARDS * CIRCUIT BREAKERS—AC & DC * CONVEYOR HOISTS * COAL CRUSHERS (double roll) 12"x16", single roll 24"x36" 30"x30" 24"x24" and 18"x16" * Diamond BIT SHARPENER * TURBO-GENERATOR 500 K.W. 275 volt DC * ROPE & BUTTON CONVEYOR 400' long LATHES, SHAPERS * LINK BELT * ELECTRIC SLATE DUMP * SWITCHES * AUTOMATIC CIRCUIT BREAKERS 250 volt 600 amps to 2000 amps * MANUAL CIRCUIT BREAKERS 600 amps to 3000 amps * HOISTS, overhead, AC, 3-60-440, 1 ton and 2 ton * CAR RETARDERS, Fairmont 85# and 100#, STEAM POWER PLANT, 2 Boilers, 2 turbo-generators, 2300 volt, 1 Clam shell bucket 1¾ cubic yard, 1—Figure 8 drum. Coal Crushers—18x16—24x24—30x30.

GUYAN MACHINERY COMPANY, Logan, W. Va.

MINING MACHINES

Goodman Standard & Universal.
AC & DC Rebuilt & Guaranteed

MINE LOCOMOTIVES

5 to 20 ton.

STRIPPING SHOVELS

M. G. SETS & ROTARY CONVERTERS

PUMPS and FANS

COAL CRUSHERS

Coal hopper with weigh pan and scale
Hydraulic Wheel Presses

Will buy, sell or exchange.
What do you need?

The Industrial Equipment Corp.

Warehouse: Carnegie, Pa.
P. O. Box 1647 Pittsburgh, Pa.

★MINING EQUIPMENT READY FOR DELIVERY★

CUTTING MACHINES

2—Type 112-AB **Universals,** 250 volt, practically new
2—Tyne 12-AA **Goodman standards**
CE-7 **Sullivans** and parts
A. C. **Motors** complete for Standard and low vein Goodmans

LOCOMOTIVES

1—8-Ton **Westinghouse,** 250 volt, 42" gage
1—6-Ton **Westinghouse,** 250 volt, 44" gage
1—6-Ton **Westinghouse,** 500 volt, 42" gage
1—6-Ton **Ironton,** 250 volt, 44" gage, low vein

GENERATORS

1—100-KW **Ridgway** M-G set, 275 volt
1—150-KW **Jeffrey,** 250 volt, Gen. only

MISCELLANEOUS

1—24 x 24 **Jeffrey coal crusher**
1—31½ x 36" **Scotdale coal crusher**
2—**Cameron Centrifugal pumps,** 650 G.P.M. 74' head
1—**Deming Centrifugal pump,** 400 G.P.M. 70' head
3—100-KVA **G.E. Transformers,** 2200 to 244-488
1—100-HP. **Natural gas engine** with 220 volt generator
A.C. and D.C. **Motors, Controllers, Compensators**

Many other items in stock. Let us know your needs—We buy, sell and trade.

ALL-STATE EQUIPMENT CO., INC.

LOGAN, W. Va. PHONE 884

PIPE—MACHINERY—GAS ENGINES
AIR COMPRESSORS—DIESELS—PUMPS

Some Steam Engines and Boilers available only slightly above the metal price

BRADFORD SUPPLY COMPANY

WAYNE, WOOD COUNTY, OHIO **Near Toledo**

BOILERS

1—B & W 300 H.P. Water Tube, ASME code, 160 lbs. working pressure.
2—B & W 650 H.P. Water Tube, 225 lbs. working pressure, complete with all auxiliary equipment.
1—B & W 400 H.P. Water Tube, ASME code, 200 lbs. working pressure.
1—Erie City 150 H.P., HRT, 150 lbs. pressure ASME.
1—100 H.P. Scotch Marine, National Board, 125 lbs. working pressure.

LOCOMOTIVES

2—Vulcan 20 ton, 4 wheel, saddle tank, standard gauge, air brakes, ASME code boiler.
1—American 41 ton, 4 wheel, saddle tank, standard gauge, cylinders 14 x 22, ASME boiler, 190 lbs. working pressure, for sale or rent.
1—American 68 ton, 6 wheel Switcher with tender, electric lights, air brakes, power reverse overhauled.
1—Vulcan 14 ton, 4 wheel, saddle tank, 36" gauge, cylinders 9 x 14, ASME boiler.

COAL CRUSHER

1—Jeffrey 24 x 24 single roll coal Crusher. New condition.

BELT CONVEYOR

1—36" x 740 ft., roller bearing idlers, complete with electric motor and belt in new condition.

MINE HOISTS

2—Single drum, 80" dia., one 400 H.P. and one 700 H.P., 2200 volts, A.C., with all modern control apparatus and safety devices, etc., new condition.

WE WILL BUY ANY MODERN PIECE OF EQUIPMENT ANYWHERE

A. J. O'NEILL

Lansdowne Theatre Bldg. Lansdowne, Pa.
Phila. Phone: Madison 8300.

FOR SALE

1—One **NORDBERG Hoist** No. 06392, 4 ft, drum, hydraulic brake direct connected 150 h.p., GE motor AC, 440 v. 3 ph. 60 cycle, speed 585, complete with panel board and ammeter.

3—One **POMONA Vertical Pump,** 75 h.p., AC, 250 v. 60 cy. 3 ph. Westinghouse motor, together with starting compensator, capacity 1000 gal. per min., 200 feet head.

4—One **ALLIS CHALMERS Pump,** type BS 13406, 100 h.p., motor AC, 220 v. 60 cy., 3 ph., capacity 1000 gal. per min., 250 feet head.

All of the above equipment in first class operating condition

FS-200, Coal Age
520 No. Michigan Ave., Chicago, Ill.

FIRE TUBE BOILERS

(NEW OR USED)

ONE WEEK'S DELIVERY AFTER RECEIPT OF ORDER

Sizes from 50 H.P. to 125 H.P., 50# W.P. to 350# W.P., Oil, Gas or Coal Fired, Shaker Grates or Stokers, Hartford or Oklahoma approved Certificate.

MOORE & COMPANY

1701 Nat'l Bank of Tulsa Bldg.
Tulsa, Oklahoma
TELEPHONE 2-0058

NEW and REBUILT
STORAGE BATTERY

LOCOMOTIVES

1½ to 10 Ton — 18" to 56" Track Gauge
GREENSBURG MACHINE CO.
Greensburg, Penna.

1500 MINE CARS

104 cu. ft. or 2.7 tons cap.
44" ga. 11'10" lg., 6' wide, 3' high
New in 1930—Good Operating Condition

FS-667, Coal Age
520 N. Michigan Ave., Chicago, Ill.

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STEAM MINE HOIST

1—24x36 First Motion Litchfield Steam Hoist complete with 7'0" C. I. Drum, Foot Brake, Hand Reverse, L. H. Throttle.

Norton Coal Corporation

Nortonville, Kentucky

REBUILT EQUIPMENT—READY TO SHIP

MINING MACHINES—250 V. DC
1—CE-9 Sullivan
1—12AA Goodman 36" ga.
1—Goodman Slabbing 42" ga.

MINE LOCOMOTIVES
1—6 ton Atlas 36" ga. AC or DC
10 ton Milwaukee GASOLINE

ROTARY CONVERTERS
1—500 kw. G.E., type HC-8, 600 volt, 900 rpm, complete with transformers and switchboards
200 kw. G.E. 275 v. DC 900 rpm complete with transformers

M. G. SETS—SYNCHRONOUS
1—150 KW Ridgway 275 v. 900 rpm. 2300 v. 3 ph. 60 cy.

A.C. GENERATOR—3 ph. 60 cy.
219 kva. G.E. 2200/440/220 v. 200 rpm.

HOISTS
25 HP. Thomas 18" face 20" dia.
40 HP. Single drum AC 220/3/60,
100 HP. Lidgerwood 2 drum AC or DC Motor

ROCK DRILLS
1—Ft. Wayne—2¼ HP 230/500 v. DC Motor

TRACK DRILLS
2—Moore Track Drills #1

PICKING TABLE
1—Jeffrey Apron Conveyor 5 HP DC Motor

DC GENERATORS—250 V.
1—110 KW Cr. Wh. 720 rpm.
1—100 KW Morgan Gard. 500 rpm.
1—100 KW Jeffrey 500 rpm.
1—75 KW West. SK 1950 rpm.

TRANSFORMERS—1 PH. 60 Cy.
25—5 KVA 220 v. 122/244 G.E.
30—7½ KVA 2200 v. 122/244 G.E.
50—10 KVA 2200 v. 122/244 West.
3—15 KVA 2200 v. 122/244 G.E.
3—37 KVA 4400 v. 185 v. Rotary Transformer
4—60 KVA 6600 v. 550 v. Allis Chalis.
3—100 KVA 6600 v. 220/440/550 v. Pgh.
3—150 KVA 2300 v. 6900 v. Pgh.
1—150 KVA 2080 v. 230/460 G.E. 3 ph.
1—250 KVA 2300 v. 460 v. G.E. 3 ph.
3—1500 KVA 22000 v. 6600 v. Allis Chal.

CENTRIFUGAL PUMPS
1—1300 GPM Gould 100' hd. 6 x 6
2—1000 GPM Cameron bronze 100' hd. 8x8
1— 800 GPM Weinman 90' hd. 6 x 5
1— 750 GPM Manistee 185' hd. 6 x 6
1— 750 GPPF DeLaval 70' hd. 6 x 6
1—Worthington 5 x 5 single stage mtd. on truck 15 HP motor
1—35 GPM Dayton Dowd 2 x 1

SCALES
6—Fair. Morse #11¼ 3 beams (2—200# ea. 1—50 lbs.) platform 16¼ x 21⅝.

DIESEL ENGINE SET
1—217 KVA G.E. 2300/220/440 v. 3 ph. 60 cy. rpm. dir. con.
2—260 HP Buckeye horiz. 2 cyl. Diesel.

SLIPRING MOTORS—3 ph. 60 cy.

No.	Hp	Make	Type	Volts	Rpm
1	700	G.E.	MT-432	2200	393
1	400	West.	CW-967A	220-440	1170
1	300	G.E.	I-M	220-440	600
1	260	Burke	EMV-65	220-440	600
3	250	G.E.	I-M	550	600
3	250	G.E.	I-M	2200/220/440	600
3	200	G.E.	I-M	2200/220/440	600
1	100	West.	CI	220/440	1750
1	75	West.	CI	220/440	860

230 V. O. C. MOTORS

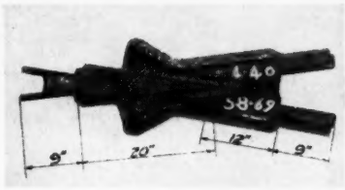
HP	Make	Type	RPM
60	West.	SK-150	875
55	West.	S-10	825
40	West.	S-8L	935
40	G.E.	RC-31	1700
35	West.	SK-140	675
35	West.	S-7	950
30	G.E.	DC	1100
20	West.	SK-100L	900
15	West.	SK-90	825
10	West.	SK	1700
10	Al. Chal.		1200
10	West.	SK-70	850

A.C. SQUIRREL CAGE MOTORS

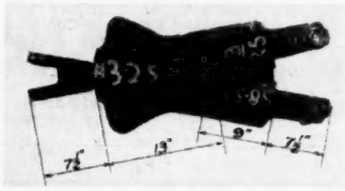
HP	Volts	Make	Type	RPM
250	550	G.E.	I-K	720
250	220/440	G.E.	KT	1200
225	2200/220/440	G.E.	Syn.	200
200	220	G.E.	I-K	600
200	2200	West.	CS	870
200	2200	G.E.	KT	1800
150	220	G.E.	I-K	450
150	550	G.E.	I-K	514
150	220/440	L. Allis	FX	1750
100	220/440	G.E.		1750

DUQUESNE ELECTRIC & MFG. CO. . . . . PITTSBURGH, PA.

CAN YOU USE THESE FROGS?



240 No. 4-40 Cast Steel Frogs.
Price $8.50 each
F.O.B. our Colliery.



480 No. 3-25 Cast Steel Frogs.
Price $6.00 each
F.O.B. our Colliery.

We have on hand, ready for immediate shipment to you, a large quantity of used frogs in the two sizes shown at the left. All of these frogs are in good condition and are bargains at the prices quoted. For further details write to C. W. Carpenter, Purchasing Agent.

THE HUDSON COAL COMPANY
Scranton, ... Penna.

ROTARY CONVERTERS

500 KW AL-CH SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
500 KW WEST. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal type, 2300/4000 V. Transformers
300 KW G.E. SYN. 575 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.
200 KW AL-CH SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal type, 2300/4000 V. Transformers.
150 KW G.E. SYN. 275 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.
150 KW WEST. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, 2300/4000 V. Transformers.

MOTOR GENERATORS

350 KW G.E. SYN. 275 V. 2300/4000 V. 3 Ph., 60 Cy., 1200 RPM, 80% P.F. Manual Switchgear.
300 KW G.E. SYN., 275 V., 2300/4000 V. 3 Ph., 60 Cy., 1200 RPM, 80% P.F. Manual Switchgear.
200 KW G.E. IND., 600 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Manual Switchgear.
200 KW R.W. SYN., 275 V. 2300/4000 V., 3 Ph., 60 Cy., 900 RPM, 80% P.F. Manual Switchgear.

LOCOMOTIVES

13-T WESTGHE, 250 V., 908-C Mts., 36" Ga.
10-T WESTGHE, 250 V., 907-C Mts., 36"-44" Ga.
8-T JEFFREY, 250 V., MH-100 Mts., 36"-42" Ga.
8-T JEFFREY, 250 V., MH-85 Mts., 24"-36" Ga.
8-T WESTGHE, 250 V., 906-C Mts., 36"-44" Ga.
8-T GOODMAN, 250 V., 132-A Mts., 36"-44" Ga.
6-T WESTGHE, 250 V., 904-C Mts., 36"-44" Ga.
4-T WESTGHE, 250 V., 902-C Mts., 36" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

WALLACE E. KIRK COMPANY
Incorporated
501 Grant Building Pittsburgh, Pa.

IRON and STEEL PIPE
New and Used
Large Stocks, all sizes
attractive prices
L. B. FOSTER COMPANY, Inc.
P. O. Box 1647 Pittsburgh, Pa.

13—MODEL 47, horizontal, 150 h.p. each FAIRBANKS MORSE Diesel Engines.
1—7 x 8 WORTHINGTON vertical, Triplex Power Pump. Reconditioned pipe—valves—fittings, 2" to 20".
Industrial Supply & Equipment Co.
CANAL BUILDING
New Orleans, La.

FOR SALE — USED SCALES
1—Motor Truck Scale—25 Ton Capacity
1—150 Ton Railroad Track Scale
1—125 Ton Railroad Track Scale
New Truck Scales—Prompt Delivery
Winslow Govt. Std. Scale Works
Terra Haute, Indiana

FOR SALE
Steam Driven Air Compressors
Large Steam Pumps
Guaranteed Used Pipe
Steel Buildings
Tanks of all kinds and sizes
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Nat'l. Stock Yds. (St. Clair County) Ill.

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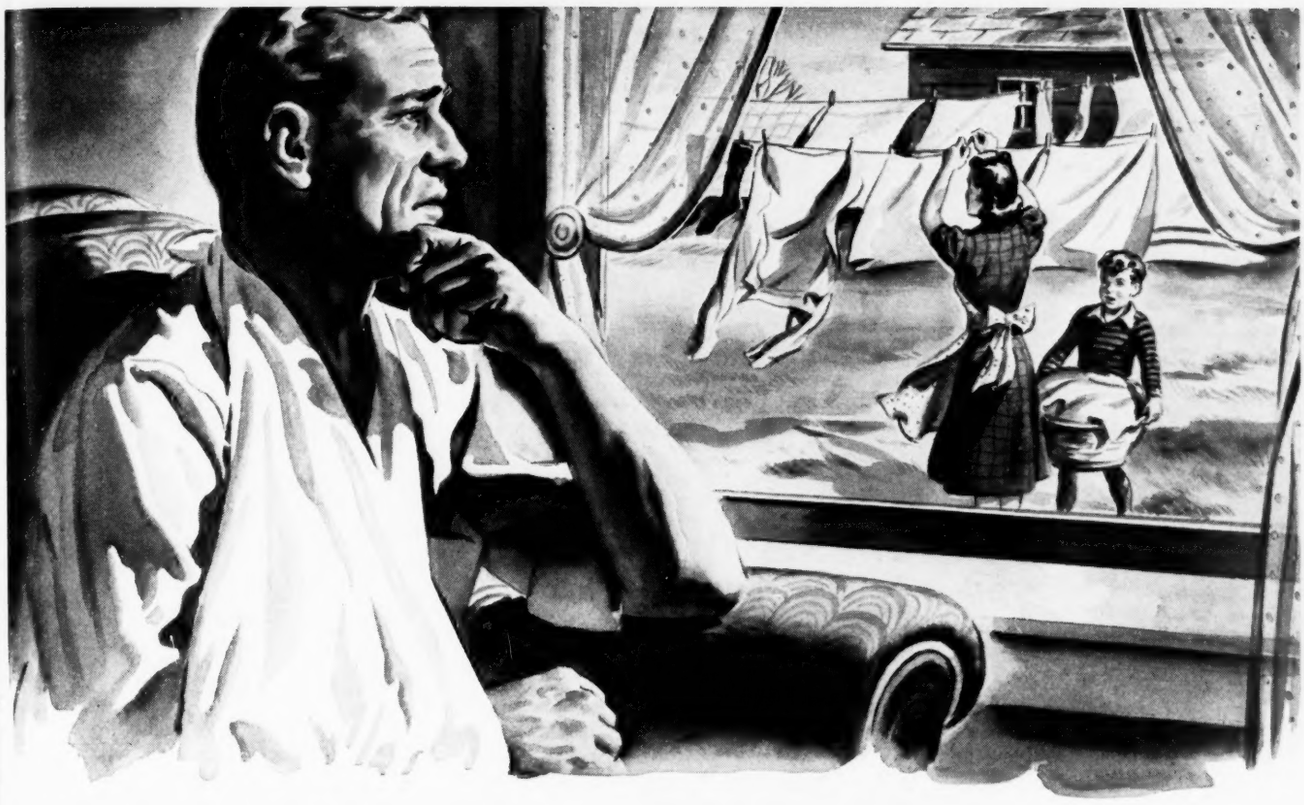


KILLED OR INJURED AT WORK LAST YEAR—

1,618,000 MEN!

HELP PREVENT MANY ACCIDENTS BY USING

AMERICAN CABLE TRU·LAY *Preformed* WIRE ROPE

During the first twelve months of this war more than 1½ million men were killed or injured by industrial accidents. That tremendous loss in productive time and needed man-power undoubtedly prevented the quick winning of several battles. Indeed, according to the National Safety Council, the lost-time through accidents could have supplied war equipment for 110,000 soldiers, sailors or marines. *And the shame of it all is that many of these accidents were needless.*

One way many operators have reduced time-out accidents is through adoption of **TRU-LAY PREFORMED WIRE ROPE.** American Cable **TRU-LAY** is a *safer* rope to handle because it is preformed. **TRU-LAY** is flexible, tractable, willing to do what is required of it without crankiness. It resists kinking and snarling and possesses remarkable fatigue resistance. More than this, broken crown wires in **TRU-LAY** Preformed do not wicker out to jab and tear workmen's hands. **TRU-LAY** doesn't ravel (and ruin itself) when cut or broken. For your next line, specify American Cable **TRU-LAY** Preformed. Do everything possible to reduce lost-time accidents.

AMERICAN CABLE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

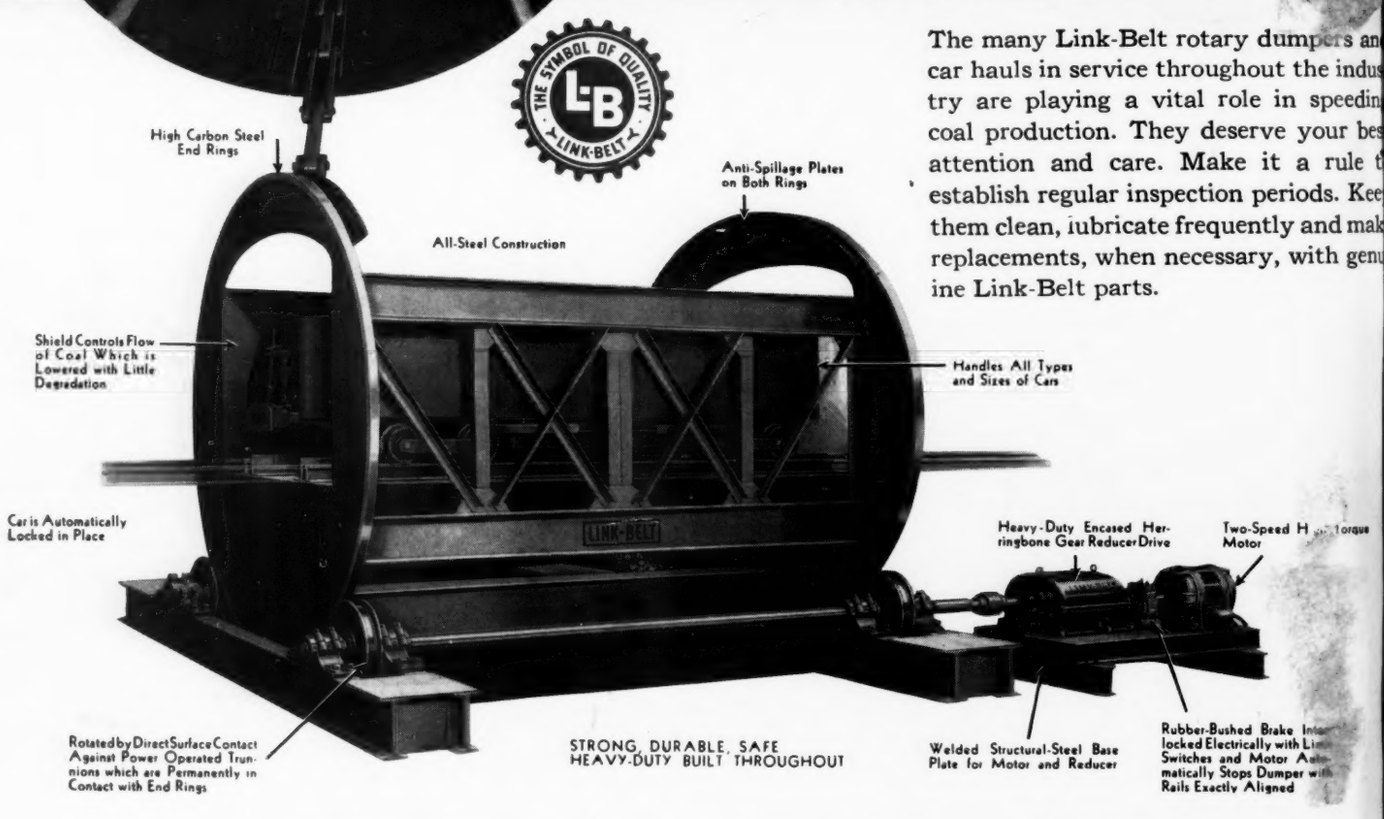
AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT, CONNECTICUT

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

THEY KEEP 'EM RO

LINK-BELT ROTARY CAR DUMPERS AND CAR HAULS



The many Link-Belt rotary dumpers an car hauls in service throughout the indus try are playing a vital role in speedin coal production. They deserve your bes attention and care. Make it a rule t establish regular inspection periods. Kee them clean, lubricate frequently and mak replacements, when necessary, with genu ine Link-Belt parts.

One man controls the complete operation of a Link-Belt rotary mine car dumper. Through push button or lever, it is automatically started, slowed down to facilitate easy, gentle unloading and stopped with tracks in line to receive oncoming cars. Cars are automatically held down in place, completely turned over and discharged cleanly without spillage. Thoroughly protected by safety devices. Handles up to 3 cars per minute in single dumpers, or 6 cars per minute in 2-car dumpers, and can be arranged to pass mine locomotives, a desirable feature at times.

Although fast and powerful, this dumper is smooth-running and operates without shock on cars and mechanism. It dumps in train or uncoupled and accommodates various car types and sizes. Sturdy construction and simple design assure maximum life and low maintenance. Send for Booklet No. 1909.

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